NOLOGY DEPARTMENT
Chemical Age, 4 October 1947

WITH METALLURGICAL SECTION

THE CHEMICAL AGE

VOL LVII 4 OCTOBER 1947 No. 1473

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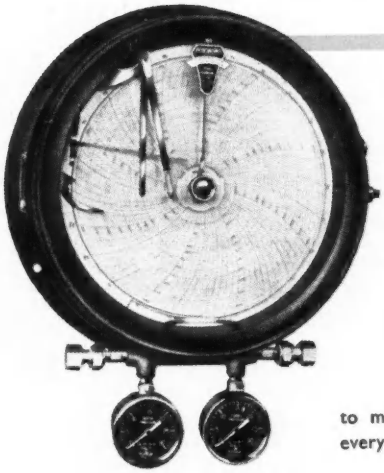

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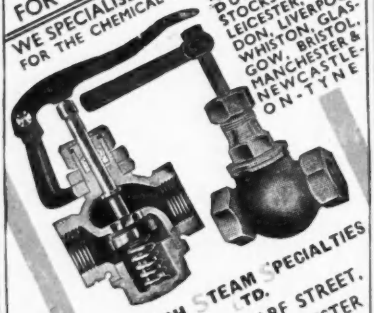

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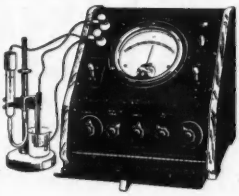

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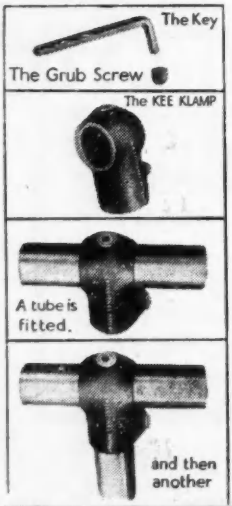

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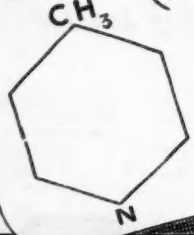

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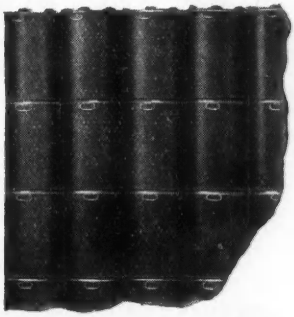

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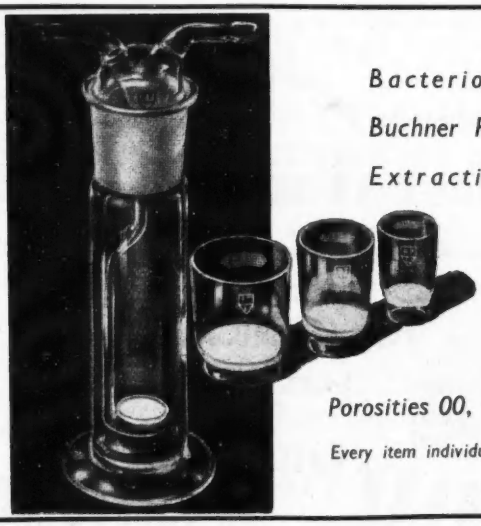

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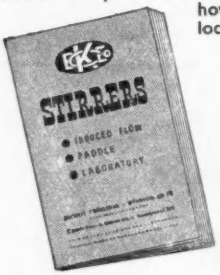

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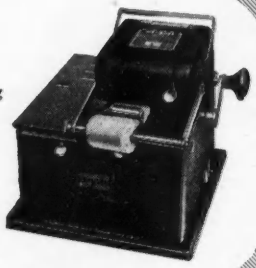

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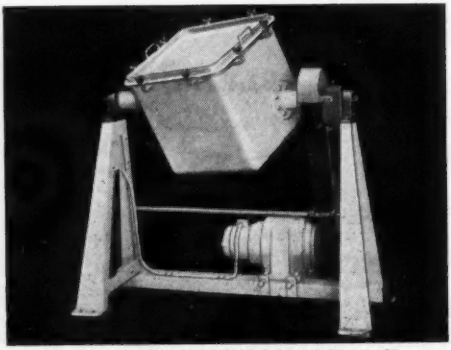

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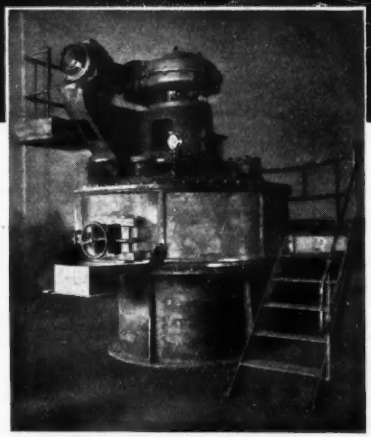

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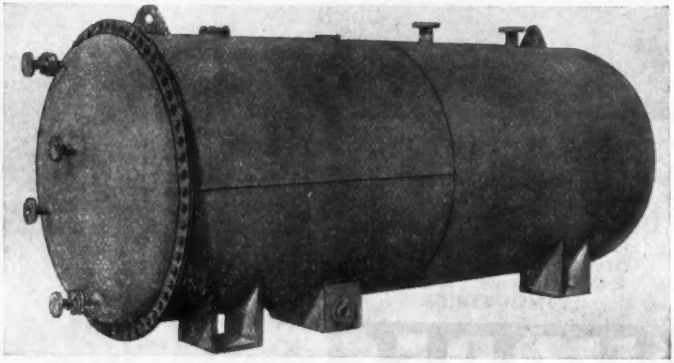

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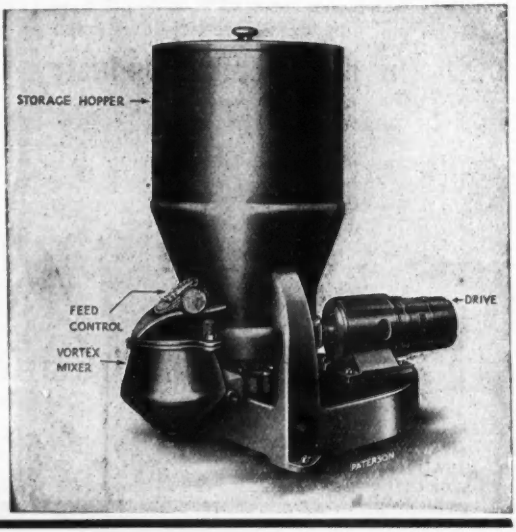

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The Electron

IT is difficult for us, who live so near to the event, to realise the immense growth of knowledge that was, and perhaps still is, to come from the discovery of the electron. The Institute of Physics has just celebrated the jubilee of this discovery and it is meet that we should pause for a moment in our consideration of molecules to think of the construction of the atom and what it has meant and may mean to mankind.

The study of the discharge of electricity through rarefied gases led J. J. Thomson to the discovery of the electron. Previously, the science of chemistry had been based on the classical hypothesis that the atom was the smallest indivisible particle in nature. Different combinations of atoms were found leading to new compounds, but in many respects the science seemed to have reached, if not an end, at least the lane leading to the end. The almost simultaneous discovery of the electron and radio-activity gave added point to the new ideas that began to move scientific men into new paths. Helmholtz had suspected the existence of the electron in 1882, but not until about 1896 were his views confirmed experimentally. It became clear at once that electricity is also atomic in nature, " an electric current or an electrical discharge consisting of the flow of negatively-charged atoms of electricity, each having a mass about 2000 times less than that of the hydrogen atom " (Tolansky). These tiny particles, 1/2000th of that of the smallest known atom, were found to be constituents of every atom of whatever element it represented. They carry the smallest electric charge known in nature, all charges being simple multiples of the elementary unit, the electronic charge. Since there were many of these in the atoms of heavier elements, it was soon obvious that in order to prevent the atoms from bursting asunder through the mutual repulsion of these charges, it must contain also a positive nucleus within it equal and opposite in charge to the sum of the electrons.

This hypothesis was accepted by most physical chemists, so that in 1921 we find Prof. W. C. McLewis (" A text-book of physical chemistry ") writing: " It is assumed that a neutral atom consists of a sphere of positive elecricity (J. J. Thomson) which contains a number of corpuscles moving in various orbits, the number of such corpuscles and the kind of motion they possess being the ultimate source of chemical and physical properties." Lewis considered it desirable to examine the evidence in favour of the real existence of " corpuscles " from which it may be inferred (correctly) that even at that date not all scientific workers were disposed to regard them as real. However, some years earlier, Prof. Soddy in his book "The Chemistry of Radio-elements " published in 1916 had said: " Chemical and electrochemical changes of valency are concerned with electrons in the outermost ring, and are reversible by loss or gain of electrons from without. Radio-active changes are concerned with changes in the inner nucleus, and such changes are not reversible by loss or gain of electrons from the ring." That was a forecast of modern theory quite remarkable at that early date. As long ago as 1813 Prout had suggested that all atoms were built up of units of

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the simplest of all, hydrogen. Recent work on atomic physics has shown, through the existence of isotopes, how near to the truth also was Prout's guess; the individual atomic nuclei are now known to be built up by different re-arrangements of a few fundamental particles, and because some of these arrangements are unstable they disintegrate spontaneously with the emission of radiation, giving rise to radioactivity.

Thus it became evident that both matter and electricity are atomic in character. This prepared the way for Planck's quantum theory which showed that radiation is also atomic. Electromagnetic radiation travels in small discrete quanta, or "packets," which in effect are atoms of radiation. The classical conception of waves has thus been discarded in favour of the corpuscular concept which in fact was first introduced by Newton, and then discarded. The important thing was that in some degree matter, electricity and radiation were shown to be similar in character and interchangeable. If therefore matter can be converted into radiation, what a source of power is put into the hands of the human race!

Thus from the discovery of the electron there has grown up a new physics and a new conception of chemical reactions as being the interchange between the electrons in the outer atomic rings of interacting atoms. From the study of the nucleus has come the realisation that many kinds of particles go to make up an atom. There is the nucleus, small, heavy, approximately 10^{-12} cm. in diameter, surrounded by an almost empty region 4000 times larger in diameter (*i.e.*, 10^{-8} cm. diameter) in which move the electrons somewhat like planets moving in orbits round the sun. The nucleus contains protons, positively-charged; neutrons, particles having no charge and approximately equal in mass to the heavy protons; positrons, particles of the same mass as the electron, but positively-charged; mesons, 50 to 500 times heavier than the electron and charged positively, negatively or uncharged; and the neutrino, an uncharged particle of mass much less than even that of an electron. Experimentally, the transmutation of one element into another and of matter into energy has been demonstrated, leading in turn to the atomic bomb and the possibility of transmuting matter into energy on the commercial scale for power production. A whole world, an exciting new world, of possibilities has been opened to man by the discovery 50 years ago of the electron. We do not yet know where it will lead us. The fact is that this new discovery of the atomic pile and the chain reaction due to the interaction of neutrons with the nuclei of certain elements is too recent for us yet to have more than a glimpse of its possibilities. It is reasonable to place our present estimates on a par with those held when the first commercial use of electricity was suggested but not yet put into practice. Who could have foretold the wonderful new processes that electricity would make possible? Equally, who knows what the future may bring in the light of atomic research? To-day, emphasis is placed upon the neutron—a particle unknown before 1930—and upon its effect on the atomic nuclei of U235 and plutonium, and of thorium. To-morrow, who knows, it may be the meson, the positron, or even the tiny neutrino that takes pride of place; it may even be none of

these but some particle as yet undiscovered. It is significant that while to-day we can transmute matter into energy by splitting the atomic nucleus into two halves, we yet know that a much greater, literally inexhaustible, supply of energy could be obtained if we could build heavier atoms from the lightest. But how? That is the questionmark of the future, a problem upon which we have not even started to work. The present results of the discovery of the electron are tremendous. The future developments are as yet unforeseeable, but are undoubtedly greater still. That is the reward that the world reaps from the encouragement of pure science.

NOTES AND COMMENTS

Educating the Chemist

RECOMMENDATIONS which, if adopted, would have far-reaching effects on the training and status of the chemist from his first introduction to chemistry in the school laboratory are contained in the current report of the Education Committee of the British Association of Chemists which, under the chairmanship of Mr. E. Leighton Holmes, has evidently brought to bear a great deal of painstaking study and practical experience on the subjects of the teaching of chemistry in schools and the training of industrial chemists and technicians. The need for such a study as this is established by the reminder in the introduction of the increasing dependence of industry and the country at large on science and chemistry and the committee has taken the view that even the early formative stages of the chemist in embryo are worthy of more attention than they appear to be receiving. Sensibly, the committee recommends, however, that no attempt should be made to force the pace; no study of science as a formal subject before the age of 11 and no premature specialisation. So vast is the field of chemical study and so rapidly is it widening that there can be little ground for dispute with the committees plea for longer and fuller preparation—with emphasis on the study of languages and literature—and increasing the pass degree course at the university from three to four years. How that is to be compassed within the time available after the National Service term has been served is a matter about which the committee confesses it is not sure, but it recommends that students obtaining entrance to a university should be permitted to do their service in a college cadet corps. That such a privilege can be secured seems at the moment unlikely, and it would in any case offer no relief to the problem of training some other classes of students, such as the laboratory technicians for whom the committee suggests definite standards to qualify for their place in a chemical hierarchy (after " senior chemists," " chemists " and " chemical assistants ") for which " improved standards of remuneration commensurate with the degree of qualification " are sought.

In Darkest Russia

SCIENTISTS throughout the world should be grateful to Mr. Eric Ashby for his book " Scientist in Russia " which throws a clear light on scientific thought and progress in Russia, in marked contrast to the fog of pro- and anti-Russian propaganda which surrounds most comment on Russian science. Mr. Ashby, a botanist, who was the first scientist to be accredited to a Legation in Moscow, was sent out by the Australian Government. Through his own efforts, and in spite of Russian Bureaucracy, he managed to make his way about the country—in marked contrast to many diplomats who complain bitterly of Russian restraint on their movements. The story Mr. Ashby has to tell will not please everybody, but it is a story that will certainly interest and amuse British chemists.

Made to Measure

MR. ASHBY answers the question frequently raised—How is the Russian scientist educated? There is no choice of subjects in the lower schools. Every child follows the same course, and each one who completes ten years of schooling has covered a course which includes a foreign language, chemistry, physics, biology, astronomy and mathematics, literature, political science and military training. Among the objects of the chemistry course are : " To make the pupil acquire, while learning the facts, theories and laws of chemistry, and the problems of their

practical application, a dialectic material (and in particular anti-religious) outlook on natural phenomena." But nineteen out of twenty children leave school before they have completed the ten-year course. Among the reasons Mr. Ashby gives for this are: a large voluntary withdrawal of children from school by their parents, for in Russia as elsewhere the poor need to have their children earning as soon as possible; and the compulsory call-up of children for the labour reserves. After this secondary education students are admitted to higher education institutes between the ages of 17 and 35. Fees from 300 roubles to 500 roubles per annum are charged and the student works for four or five years, at the end of which he may take as many as 45 examinations, including an examination in Marxism-Leninism. The student who wishes to become an industrial chemist has these alternatives open to him: he may enter a university which trains chemists for "pure research," or he may enter one or other of the twelve institutes for chemical technology. Students in their fifth year at a technical institute do not (as in the university) engage on a research problem; instead they have to plan a factory or a chemical plant. Having successfully passed through the university or technical institute a would-be research worker has to go through a course of post-graduate training which consists of two years as an "aspirant" followed by an examination and the presentation of a thesis. If the "aspirant" passes he is called as a "candidate" and begins research for a doctor's degree, receiving from 600 to 1000 roubles a month.

He Confessed

TO the question "What does the Russian scientist think of the Russian government?" Mr. Ashby replies that in general to the scientist as to the ordinary Russian man or woman the Communist régime is accepted as something inevitable and tolerable, though hard: like the climate. In the science institutes, which are under the control of the Academy of Sciences, and where government scientific work is carried out, a minority of the workers belong to the Communist Party. But all workers are under the observation of the party, probably through agents of the N.K.V.D. (formerly the notorious OGPU). In connection with these latter gentlemen Mr. Ashby gives an amusing account of a three-days' journey from Moscow to Murmansk in company with a colonel of the N.K.V.D. whose very presence cast a chill over the company. The aloofness of these agents may be gathered from the fact that it took Mr. Ashby three days to thaw out the colonel—and he never found out his name. The amusing story in the columns of the *Daily Telegraph* this week may well have originated in Russia. A British lecturer, giving an elementary lesson on British literature to a Russian audience in Moscow, began with a few simple questions. He asked one man—"Who wrote 'Hamlet'?" The man was discomfited, but vigorously denied writing the play. N.K.V.D. officials present decided that the man "might be telling the truth." But some days later the lecturer was rung up by the N.K.V.D. who told him: "Likudsky has now broken down. He has confessed that he did in fact write 'Hamlet'." But there is hope in Mr. Ashby's conclusion that the Russian scientist is, without doubt Britain's keenest ally in our efforts to break down government-imposed barriers.

Progress by Candlelight

FAR and wide are cast the benefits of nationalisation and no place, it seems, is too small to share the fruits. To the village of Abernethy between Perth and Newburgh the prospect that the gas industry may be nationalised and the fact that the collieries have been—with effects upon the price, quality and availability of coal with which we are familiar—has brought an urgent demand for candles. Later, maybe, it will be rushlight. For longer than most people can remember Newburgh has had its own gas supply provided by the private gasworks of Mr. James R. Stevens. That was before nationalisation had cast its benison. Since then Mr. Stevens has been seeking to sell his gasholder, retorts, goodwill and all that goes with a private gas company to Perth Town Council, who might or might not be able to make gas economically at current coal prices. Perth decided otherwise and, they added, the prospect of nationalisation and the unwillingness of the Ministry of Fuel to give a guarantee against loss should the industry be taken over made the proposition wholly unattractive. So the gas jets in Abernethy's cottage homes flickered and went out. The tide of centralisation sweeps bravely on its way.

Chemical Trading in August

Export—Import Returns Show Adverse Trend

A WIDESPREAD falling off of U.K. exports of chemicals and a fairly consistent rise in the import totals are observable in the August Trade and Navigation Accounts of the U.K. (H.M.S.O., 4s. 6d. net). The market diminuation in overseas trading is by comparison with August totals a year ago, but the trend is also apparent in many cases when contrast is made with the returns for last July. Particularly heavy was the falling off in sales of the sodium group of chemicals, of which carbonate disposals were halved at 226,344 tons, although this was not greatly lower than the return for July. Caustic soda underwent proportionately an even greater reduction to 100,551 tons, which compares with nearly 245,000 tons a year before.

Salt sales also dropped nearly 2000 tons to 18,544 tons. Other striking reductions were of chromate and bichromate from 1177 tons in August last year to 43 tons, of sulphate and salt cake.

The strong rise in volume of imports is chiefly marked in purchases of acids, which were already apparent in the last monthly figures, and in heavy buying of calcium carbide—42,020 cwt., against 1670 cwt. last month and 987 cwt. a year ago. Carbon blacks represented another notable increase, to over 109,000 cwt., compared with some 67,000 cwt. in 1946.

CHEMICAL EXPORTS

	Aug., 1947	Aug., 1946
	Cwt.	Cwt.
Citric acid	423	1,196
Formic acid	3,877	4,925
Tartaric acid	651	813
	Tons	Tons
Aluminium oxide	510	20
Sulphate of alumina	2,219	3,340
All other kinds	374	521
Ammonium compounds	26,952	24,760
Nitrate	2,470	4,859
	Cwt.	Cwt.
Bleaching powder	35,558	40,899
Calcium carbide	1,294	18,939
	Gal.	Gal.
Benzol	257,988	755,326
Cresylic acid	149,136	303,485
Tar oils	3,194,111	162,861
	Tons	Tons
Copper sulphate	809	2,358
	Cwt.	Cwt.
Disinfectants, etc.	49,558	71,728
Glycerine	160	7,976
Lead acetate, litharge, red lead, etc.	5,677	7,109
	Gal.	Gal.
Tetraethyl lead	59,097	—
	Cwt.	Cwt.
Nickel salts	4,279	11,990
Potassium compounds	5,187	10,729
	Tons	Tons
Salt	16,092	18,544
	Cwt.	Cwt.
Sodium carbonate	226,344	465,294
Caustic soda	100,551	244,957
Chromate and bichromate	43	1,177
Silicate (waterglass)	6,348	12,374
	Oz.	Oz.
Quinine and its salts	113,141	177,988
	Mega Units	Mega Units
Penicillin	168,536	—
	Cwt.	Cwt.
Coal-tar dyestuffs	15,845	18,567
Extracts for tanning	10,924	19,146
Earth colours	13,210	16,358
Lithopone	2,249	13,750
White lead	342	1,377
Soap (excluding toilet, shaving and abrasive)	19,929	12,626
Paraffin wax	3,047	300
***Total value of chemical manufactures (excluding drugs and dyes)**	3,073,601	3,398,005

CHEMICAL IMPORTS

	Aug., 1947	Aug., 1946
	Cwt.	Cwt.
Acetic acid	9,974	4,708
Boric acid	4,000	—
Tartaric acid	900	—
All other kinds of acid	2,815	13
	Tons	Tons
Ammonium phosphate	3,062	5
	Cwt.	Cwt.
Borax	13,500	7,100
Calcium carbide	42,020	987
Glycerine	116	10
	Lb.	Lb.
Iodine	59,569	119,142
	Cwt.	Cwt.
Caustic and lyes	2,724	2,742
Potassium chloride	775,532	343,617
Potassium sulphate	29,210	1,840
All other potassium compounds	3,169	833
Sodium nitrate	19,940	132,689
	Pf. Gal.	Pf. Gal.
Ethyl alcohol	270,049	—
	Oz.	Oz.
Quinine and its salts	137,550	—
	Lb.	Lb.
Menthol	9,918	5,498
	Cwt.	Cwt.
Synthetic organic dyestuffs	503	489
Carbon blacks	109,308	67,156
	Lb.	Lb.
Essential oils	Cwt.	Cwt.
Turpentine	12,825	5,399
Paraffin wax	56,748	38,786
***Total value of chemicals, drugs, dyes and colours**	£ 2,591,018	£ 1,536,852
***Oils, fats and resins**	8,801,517	7,698,446

** Including some commodities not listed here.*

JOINT PRODUCTION COMMITTEES

"The usefulness of joint consultation, when carried out in the right spirit, has been proved by experience," said Mr. George Isaacs, Minister of Labour, outlining at the conference at Oxford last week of the Confederation of Management Associations the Government plants to revive voluntarily a system of consultation between managements and workpeople of the type which operated with marked success in the war. He emphasised that only when agreement has been reached at a national level within an industry will the regional industrial relations officers seek to set up joint production committees.

Training and Status of Chemists

Comprehensive Recommendations by the B.A.C.

"EDUCATION in Chemistry" the report of the education committee of the British Association of Chemists, which the association has now issued in booklet form (2s.) provides in a comparatively small compass the most comprehensive survey of chemical education yet attempted. It reviews in 29 pages the teaching of chemistry in schools, the training of chemists and chemical technicians for industry, the recruitment and training of teachers and some associated subjects, representing the findings of a committee of 12 experts of which Mr. E. Leighton Holmes was the chairman.

Longer Training

Practically all the findings of this committee are conditioned by the recognition that the scope of chemical science is today so wide, and so elaborate are its ramifications that more extended study is required at almost every stage. The committee consistently recommends wider study for longer periods whenever this is possible and does not underestimate the importance of ancillary equipment such as the study of languages and literature and the "humanities."

Summarising its objectives, the committee states:—

> The granting of equivalent status to qualifications in technology and pure science is recommended and the desirability of providing alternative avenues of approach to the professional status of chemists is advocated. It is felt that efforts to achieve unity within the profession should be intensified. . . . Finally, it is emphasised that anyone reaching a given standard of education should be adequately recompensed, so that juniors will receive proper encouragement to improve their status.

Of university training, the report observes:—

> During recent years there has been a tendency, especially in the modern universities, to convert university education into a continuation of school teaching. This is largely the result of the enormous increase in scientific knowledge which it is felt should be crammed into the student, but it should be recognised that the student at the university must not only be taught, he must educate himself to take part in the social life of the college and of the world at large. . . . It appears to us that the only way in which these important hopes can be realised is by increasing the normal pass degree course from three to four years.

Master's Degree

After recommending an increase of the proportion of practical work and criticising the tendency to pay too much attention to a few brilliant students at the expense of the ordinary student, who remained "the backbone of the profession," the report says:—

> A better arrangement would be for all graduates to pass an examination in fundamental knowledge of all branches of chemistry which are essential to everyone who seeks to call himself a chemist. Degrees of various classes would then be awarded for a high standard of proficiency in the same examination taken by all degree students in chemistry and there would be no special subjects or additional time required or allowed for the Honours qualification. Full attendance for a minimum period of four years for a degree is no doubt desirable, as stated above, but it is doubtful if it is practicable.
>
> Students who have ability should then be encouraged to spend another one to one and a half years specialising in some branch of chemistry, inorganic, organic, physical, industrial, metallurgical, analytical or biochemical, or in chemical engineering, possibly with compulsion to study a suitable subsidiary subject.
>
> On the result of such an examination he should then be awarded a Master's degree, for which Honours can be awarded.
>
> Some scheme of this nature would result in chemists of far better calibre than the present system, and the Bachelor's degree would meet the needs of those who wished to take up school teaching as a career. The present B.Sc. Honours degree and course of Higher standard would thus become the Master's degree and would involve training in research methods combined with an additional examination in a specialised branch of chemistry.

Professional Status

One of the ultimate objectives of the committee's study was to provide clearly defined standards of chemical attainments as well as their acquisition, and a large section of the report is concerned with professional status of chemists and chemical technicians in industry. It observes:—

> One of the main difficulties in discussing the training of chemists arises from the number of ways in which a knowledge of chemistry may be gained and become the source of livelihood. There is also in many quarters the insistence on making a distinction between the "professional" and "non-professional" grades.
>
> It has to be recognised, however, that the same "professional" standards expected of the independent consultant require some modification when applied to the wide range of people employed in chemistry at the present time in industry or in teaching. In many factories, for example, men who have reached managerial rank after taking their degrees in their spare time, or who have studied for their degrees at a university, are working side by side with others who have acquired the same status as the result of factory experience alone.
>
> To define the transition point at which a chemist enters the professional class is to make too fine a distinction under modern conditions. It is, however, necessary to attempt a classification for chemists and others engaged in chemistry, so that appropriate educational schemes and qualifications can be satisfactorily applied.
>
> We consider that, once recognised qualifications are agreed for the sub-degree levels, the use of the word "professional" should be restricted to those who hold a diploma recognised by a registering body emanating from a federation of chemical organisations.
>
> As a simplified classification which is capable of further subdivision in each group we suggest:—
>
> (1) *Chemists.*—Graduates or recognised equivalent status—*i.e.*, on the lines of A.R.I.C. or B.A.C. full member qualification.
>
> (2) *Chemical Assistants.*—Chemical assistants and those engaged in chemical process work requiring a lower standard of knowledge than Grade I, and equivalent to B.A.C. associate members.
>
> (3) *Laboratory Technicians.*—Laboratory assistants of various grades to be defined under separate schedule.

GAS PRODUCTION AND THE CHEMICAL INDUSTRY—II

by Dr. J. S. van AKEN

COKE-OVEN gas of pure quality is excellent for various industrial applications. One type of gas, however, will not be sufficient to meet all requirements, which sometimes differ very much. For one application a hot but short flame may be desired, and for another the flame must be long and luminous.

As a rule the chemical industry is only interested in those components of the gas which are highly reactive and from which chemical products can be derived. Consequently, only the hydrogen and the ethylene are extracted.

In order to separate these gases from the coke-oven gas, additional purification is needed. In doing so, carbon dioxide, as well as traces of naphthalene, benzol, toluol and various unsaturated hydrocarbons present are completely eliminated. This thoroughly-cleaned gas is separated into a number of fractions. Not all of these fractions are utilised by the chemical industry. Some two-thirds of the heat available in the coke-oven gas is still present in the residual gas, which has a calorific value higher than that of the original coke-oven gas. Considerable quantities of these residual gases are available.

In the internal gas economy of the two big combines now existing in Holland, and consisting of collieries, blast furnaces, steelworks, rolling mills, power stations and chemical works, the outstanding qualities of the residual gas have been readily recognised so that this gas has found wide application in those works.

But why should the utilisation of this gas be restricted to these industries only, seeing that in other sectors of industry the gas could be used to better advantage?

Gaseous Fuels and Gases

In searching for the best way in which the limited coal resources can be utilised for our national economy, many possibilities are here offered. If the gas-consuming industries could specify the characteristics of the gaseous fuels required, while at the same time the chemical industry would indicate to the consumer what are the possibilities, it may be feasible to secure a gas of the appropriate quality by making a choice of the available gas fractions, or by mixing them according to the requirements.

In Western Europe the period in which there was an abundance of fuel has ended. In those days it was neither necessary nor possible to find in the Netherlands a better use for coke-oven gas than for steam raising. Nowadays, however, there is a great shortage of gas.

By replacing the gas-fired steam boilers by boilers heated with coke breeze, and by heating the coke ovens with producer gas (*i.e.*, with coke) instead of coke-oven gas, and by other measures, practically all the gas produced could be placed at the disposal of the chemical industry and the public gas supply.

In carbonising coal, only part of the coal is converted into gas. Both the chemical industry and the public gas supply are demanding far more gas than can be obtained by carbonising the coal available which has the required properties. Since insufficient gas can be obtained by coal carbonisation, part of the coal available must be gasified.

Coke as Raw Material

In the Netherlands it has been decided not to use coke-oven gas any longer, but to use coke as the raw material for the future extension and development of the chemical industry. In this way the coal will be utilised to the best advantage, since in the primary carbonisation process the valuable products benzol, toluol and naphthalene are recovered, while in the secondary phase the coke is gasified, thus converting the coal completely into gas.

For the chemical industry it is a matter of importance to secure an extremely pure mixture of gases, which may otherwise be of a simple composition. Starting from various raw materials such as lignite, coke or coke-oven gas, the same final result can be obtained in the chemical industry. The public gas supply, however, makes totally different demands in this respect. Density, calorific value and combustion characteristics are some of the decisive factors, so that it is not always easy to use different raw materials to obtain a gas of which the above-mentioned properties do not vary. Hence, it was decided in Holland to apportion as much coke-oven gas as possible for the public supply, and to divert to the chemical industry another raw material, in this case coke.

Coke can be gasified either with steam and air, or with steam and oxygen. If steam and air are used, the process is discontinuous and a lower efficiency is obtained.

With oxygen, a continuous process is feasible in which the gasification is conducted at the highest state of efficiency. By continuous operating it is possible to maintain a constant temperature of reaction

and to obtain a gas of the desired unvarying composition. These advantages are so evident that they overbalance the expenditure involved in producing the oxygen.

From a technical point of view it is not difficult to obtain a good gas for ammonia synthesis by the complete gasification of a solid fuel.

By gasifying coke it is far more difficult, however, to prepare a gas for the public supply equivalent to that hitherto delivered, since, as already mentioned, it must satisfy certain specifications as to density, calorific value and combustion characteristics. Yet, a scarcity of suitable coal and an ever-increasing demand for gas may rather soon make it necessary to adopt complete gasification for public gas supply purposes also.

German Practice

In Germany, for instance, and for the same reasons, a process has been developed for the complete gasification of coal. In this process, oxygen is used in order to obtain a gas sufficiently similar to that hitherto delivered to the public supply. In underground coal gasification, also, a gas of proper composition and an adequate efficiency can be reached only if oxygen is available. All this suggests that the preparation of oxygen will play a notable part in the future production of gas.

Fortunately, in recent years the practice of oxygen production has been considerably improved. At present, not only are bigger units built, resulting in smaller capital investment and operating expenses, but they also work at lower pressures, by which the energy required for the production of oxygen is considerably reduced.

In modern methods the air is compressed only to 5 atmospheres, for which only 0.40 kW is required per cu. m. of oxygen, whereas conventional processes require compression to 25 atmospheres and even to 60 atmospheres, the consumption of energy being 0.80 and even 1.15 kW. Nowadays, oxygen can be produced so cheaply that it is justifiable to use it in the gasification process. The fact that the chemical industry is beginning to use oxygen for the production of synthesis gas necessitates a mastery of this technique. Undoubtedly, the knowledge and experience acquired therein will also be of use for the public gas supply, when the change-over to complete gasification becomes necessary.

This paper may have given the impression that the entire public gas requirements should be supplied by some big industrial combine. The public gas supply would then be linked to the coke-oven plants and the chemical industry. That, however, is unlikely. It would be advisable, nevertheless, to arrange as far as possible that the gas produced by those industries should be placed at the disposal of the public supply. The gas required by municipalities and industries exceeds the quantity which the combine plants can deliver. Consequently, gasworks, the sole or principal aim of which is to provide for the public gas supply, will always be needed.. The gas should preferably be produced by the carbonisation of coal, either by converting coking coal into metallurgical coke, or gas coal into gas coke.

It will depend on the availability of coking coal and gas coal in the European market whether these works are built as coke-oven plants carbonising coking coal, or as gasworks using gas coal as a raw material.

If it should appear that an inadequate quantity of both coking coal and gas coke will be available, then part of the gas should be produced by complete gasification.

In most of the gasworks only part of the hydrocarbons, benzol, toluol, etc, are recovered from the gas. In recent years the need for hydrocarbons in our national economy has been gradually increasing. The plastics industry, especially, requires ever-increasing quantities of these products. A future shortage of these raw materials can be foreseen, and preparation of aromatic from aliphatic hydrocarbons has already been considered.

Most gasworks produce a quality of gas unsuitable for industrial purposes on account of its varying composition. Many gasworks have in addition to their coal carbonising installation a water-gas or a carburetted water-gas plant. When in winter consumption increases, the percentage of water-gas is raised. It is impossible, of course, to obtain a gas of unvarying composition in this way. In consequence, it can be easily understood that this gas has practically no chance of industrial application, whereas 50 to 60 per cent of the coke-oven gas is consumed by industry, apart from the enormous quantities used by the industrial combines themselves.

Hydrocarbon Recovery Incomplete

The recovery of hydrocarbons at several gasworks—many of them small ones—is incomplete, so that the gas they deliver is not particularly suitable for application in the major industries. There is every reason for not continuing on the same lines. Industrial expansion, especially in the direction of the manufacture of high-quality articles, is a matter of absolute necessity for the Netherlands.

The gas industry, too, can contribute to the creation of favourable conditions, economic and technical, for other sections of industry. Consequently, the future production of gas should be carried out in big manufacturing units. Since the gas is delivered under pressure, it is logical also

(*Concluded on page 464*)

Chemically Modified Wood

MANY questions of interest to chemists are discussed in an article on "Chemically Modified Wood" written by Professor Edwin C. Jahn in honour of the 60th birthday of Professor E. Hägglund, the well-known cellulose-chemist, in the September 15 issue of the Swedish journal *Svensk Pappers Tidning*.

Professor Jahn, who is professor of Forest Chemistry in the New York State College of Forestry at Syracuse University, after surveying the recent literature on the modification of wood, comes to the conclusion that although our knowledge of the chemistry of modification of cellulose is slowly accumulating, much fundamental work remains to be done before satisfactory processes are developed for making wood plastics or structural board from comminuted wood.

Both the physical and chemical properties of wood and cellulose may be altered by various chemical treatments, he points out. Cellulose undergoes a large number of chemical reactions resulting in cellulose products of widely differing properties. The products formed may be (1) clearly defined cellulose derivatives such as the cellulose esters and ethers, (2) addition compounds or molecular complexes of a more or less unstable nature, such as alkali, ammonia and amine cellulose, cuprammonium complexes, addition compounds with inorganic acids, quaternary ammonium bases and others, (3) compounds resulting from the alteration of some of the functional groups of cellulose, such as the oxidation of the primary hydroxyls to carboxyl groups by nitrogen dioxide or the secondary hydroxyls to dialdehyde groupings by periodic acid, and (4) cross-linked cellulose chains bridged by the introduction of groups which attach to adjacent chains.

Technology Undeveloped

The technology of modifying the properties of wood, Professor Jahn notes, has not advanced to the same degree as it has with cellulose, despite the fact that wood has certain undesirable properties, such as dimensional instability, which need improvement. Wood, being a complex mixture of substances, does not enter into well-defined chemical reactions.

The morphological and colloidal structure of wood tissue is such that the constituents of wood are not easily separated even as derivatives. The cellulosan hemi-celluloses are intimately associated with the cellulose and difficult to separate, yet when once removed, the cellulosans are soluble in dilute alkali and the remaining cellulose is crystallographically more perfect. Microchemical studies also show that lignin and cellulose are intimately associated in the secondary cell wall, forming a finely interpenetrating system. Furthermore, there is considerable indirect evidence that the polyuronide hemicelluloses are chemically combined with lignin.

These considerations, points out the author, make it understandable why wood does not behave as a simple mixture of its components as we know them in their separate isolated forms. Furthermore, wood, when esterified or etherified, does not behave as a simple mixture of its component derivatives.

Comparison with Cellulose

Referring to the modification of cellulose, it is noted that the preparation of selected cellulose derivatives gives desired solubility and other characteristics permitting the spinning of filaments, the casting of films and plastics, the formation of lacquers, and the development of a number of other industrial uses. Physical changes are also brought about by chemical treatment, the best example being the mercerisation of textiles by strong caustic soda solution, and the parchmentisation of paper by concentrated acids or zinc chloride solution.

After many attempts to bring about cross-linking between cellulose chains to increase the wet strength of rayon and of paper, it has been found that formaldehyde is the reagent which gives the best results, and this is now applied to rayon industrially. The reaction between formaldehyde and cellulose is an acetal type of reaction in that it involves an aldehyde group and two hydroxyl groups.

Among other work on cross-linking appears a patent claiming that wood pulp with 12-14 per cent of beta and gamma celluloses (soluble in mercerising strength caustic soda solution) is rendered entirely alkali insoluble by formaldehyde treatment. Should this work be verified, the author comments, it would indicate that the short hemi-cellulose (cellulosan) chains may be linked together by methylene bridges through condensation with formaldehyde to form larger molecular particles.

Professor Jahn states that methyl and other ether groups can be readily introduced into wood in appreciable amounts. Methylated beechwood has been prepared with 39.4 per cent methoxyl and spruce with 40 per cent methoxyl. Wood, he adds, may also be methylated with diazomethane indicating that acidic groups, *i.e.*, carboxyl, phenolic or enolic groups, are present in the wood.

A number of other "wood ethers" have been prepared including the ethyl, hydroethyl and benzyl ethers. All of these products retain the appearance of the original

wood. A characteristic property of the wood ethers, points out Professor Jahn, is their relative insolubility in organic solvents. This has made them of little commercial interest.

"Wood esters" can likewise be prepared by the usual esterifying agents. The acyl derivatives, like the "wood ethers," retain the appearance of the original wood and are insoluble or only slightly soluble in common organic solvents.

On the other hand a nitrated wood may be prepared which is over 90 per cent soluble in acetone. Under suitable nitrating conditions (10 to 13 parts by weight of water to 100 parts acid nitrating liquor at 18°-0° C.) woody tissues may be nitrated with little degradation, giving products in high yields which contain 10-11 per cent ester nitrogen. When slightly dampened with acetone or other solvents or swelling agents, the material may be moulded directly or mixed with compatible plasticisers such as camphor, and moulded. The nitrated wood is similar in its properties to nitrocellulose and is as easily worked into plastics, films, lacquers, etc.

The acetylation of wood has been studied by a number of investigators. A single acetylation by acetic anhydride with sulphuric acid as a catalyst gave an acetylated pinewood with 41 per cent and an acetylated beechwood with 42.2 per cent acetyl groups. Various other esters, such as the butyrate and benzoate have also been prepared.

Wood as a Plastic

Discussing the question of wood as a plastic and for use in moulded products, Professor Jahn states that water and heat increase the natural plasticity of the wood, the water acting as a plasticiser. Comminuted wood may be formed into plastic products by (1) acid hydrolysis, (2) thermal processes and (3) chemical condensation processes.

The first method involves partial or complete hydrolysis of the cellulosic part of the tissue, leaving a ligneous residue suitable for making lignin plastics. The second method involves the use of high temperatures and pressures. When untreated wood is heated and pressed at relatively high temperatures (200-250° C.) there is sufficient plastic flow to permit coalescence of the wood particles to form dense products of considerable strength. This is the basis of a successful industrial process for making fuel briquettes from wood wastes, which has been in continuous operation for over 15 years.

The third method, chemical condensations or reactions with wood to produce plastics has received much study but no suitable industrial process has yet been developed. In one process sawdust or agricultural wastes are digested at 11.35 kg. per sq. cm. for three hours with aniline and water. A lignin-aniline complex results and some hydrolysis of the carbohydrates takes place. Furfural is recommended as a plasticiser.

Among methods to improve dimensional stability, Professor Jahn mentions surface coatings or pore sealers (paints, oils and waxes) to retard the movement of moisture into the wood substance, and impregnation with water-repellant substances, such as paraffin or other waxes, to retard shrinkage. Latest research, however, is along the lines of controlling or interfering with the mechanism of the swelling-shrinking cycle. Three techniques have been developed (1) bulking effect, to keep swollen wood at approximately its swollen dimensions by introduction of non-volatile substances such as sugars and salts; (2) cross-linking, to reduce the number of hydroxyl groups together with simultaneous bridging by non-hydroscopic linkages between molecular chains and structural units, and (3) plastic flow, by pressing wood under conditions of heat and pressure which cause plastic flow, presumably of the lignin.

The Moisture Problem

The disadvantages of the first method—impregnating wood by aqueous solutions of very hygroscopic materials such as sugars, zinc chloride, etc., is that the wood is always moist. Other substances for impregnating are waxes and water-soluble phenol-formaldehyde intermediates which give good results as the molecules of the latter are sufficiently small to permit good penetration. Furthermore they exhibit an affinity for wood by the fact that their aqueous solutions cause wood to swell beyond its normal green dimension. A number of commercial phenol-formaldehyde resinoids have been tested and found satisfactory, but because of the difficulty in getting complete and uniform penetration on large pieces of wood, the resin treatment of wood is considered practical only for veneers and plywood.

Concluding, Professor Jahn points out that a survey of some of the recent literature on the modification of wood indicates that despite the imperfect knowledge of the mechanisms involved, some technical advance has been made. Some of the developed processes reduce the undesirable hygroscopic property of wood and improve certain other properties. Some modified wood products are now being produced for special uses.

Our knowledge of the chemistry of the modification of cellulose, he adds, is slowly accumulating.

OBITUARY

DR. HARRY THORNTON CALVERT, chemical inspector and director of water polution research to the Ministry of Health, has died at Herne Hill at the age of 61.

CHARCOAL PRODUCTION IN BRITAIN

Modernised Methods to Supply Rising Demands

BECAUSE of current shortages, of materials and currency alike, continued development is anticipated in the British charcoal producing industry which war-time needs had raised to a higher state of efficiency than it had enjoyed possibly for a century or more.

Shortage of foreign currency is now reproducing in part the conditions imposed during the war when accustomed imports from Canada and the Scandinavian countries were either severely limited or terminated. Stringency of the fuel situation is another factor tending to confer added importance on the charcoal industry, and now the widespread withholding of petrol seems likely to encourage fresh demands on its output for the producer gas units which helped to relieve some of our war-time transport problems.

From the point of view of the chemical and smelting industries, charcoal is an essential raw material, with an increasing number of uses.

The Canadian charcoal producers, who since the war have been anxious to revive their English market which they are in a very good position to supply, if currency was available here, initiated a detailed survey of English production capacity, an informative piece of market research given publicity in the Canadian *Commercial Intelligence Journal*. Much of this report is of equal, or greater, interest here, especially in the present exigency.

Increased production and improved methods by which special grades of charcoal are being produced for specific chemical and allied processes are the keynotes of the industry in its revised form.

Change in the Kilns

The Home Timber Production Department of the Timber Control, which had charge of charcoal production since the early stages of the war, reports that the design of the portable steel kilns has remained substantially the same, the chief change being that these are now made in two sections instead of three as formerly. It has been found that this change has little effect on portability, while manufacturing is considerably simplified, and one source of potential air-leaks is eliminated. Other minor modifications include re-designed flue-boxes and flue-pipes of sturdier construction and bottom-sections reinforced at the base with steel of double thickness and vertical T-section ribs.

In the New Forest, where installations are of a more permanent nature than usual, producers have experimented with lining the kilns with firebricks. This has the advantage of prolonging the life of the kiln almost indefinitely, but the cost is high and it has been found that radiation from the bricks prolongs the cooling period to an undesirable extent.

A change which has proved successful is the construction of a special concrete base for the kilns, which permits of their being emptied from the outside. A trap in the base is covered with a steel tray during the loading, burning and cooling processes and when the kiln is ready for emptying, the tray is withdrawn and the charcoal bagged up with long-handled rakes and shovels. The job is much less unpleasant for the workmen and the crushing of the charcoal into dust is avoided. It is, however, an economic measure only when the kilns are to remain on one site for a fairly long period.

Lay-out of Batteries

The layout of batteries has been standardised, in the light of experience, as follows:

The kilns are arranged in a straight line, some 10 to 12 ft. apart, with a track (either of rails or sleepers) running the whole length, so that the saw bench can be moved up to the kiln being loaded. On the other side of this track the cordwood is stacked; this is handed down in the length to the man at the saw, cut into lengths of about 18 in., and thrown straight into the kiln.

On the far side of the kilns is another track on which the charcoal is loaded on to bogies after bagging and run into the storage shed. The latter is so located that from its far side the charcoal can be loaded direct on a lorry standing on the hard road.

An exception to this standard layout has been made in the case of a battery operating in Huntingdonshire. This is a 100 per cent charcoal operation in a stand of several hundred acres of birch, and is the biggest and most ambitious of the charcoal projects.

In this case the trees are cross-cut to a convenient length in the woods, and the lengths are brought in by rail to a miniature mill and put through a slasher which has five circular saws mounted 9 in. apart on one spindle. The billets are fed automatically by a belt conveyor from the slasher into trucks run on a rail track raised some 4 ft. off the ground, on either side of which is a row of fifteen kilns.

Due to the raising of the rail track (which considerably reduces the effort required to load the kilns) and to the fact that the kilns can be emptied from the outside, it has been found that women can undertake these jobs satisfactorily.

No important changes have been made, or called for, in the original technique of burning. Each burner has his own theories on such points as whether the charge should be lit at the top or bottom or midway, the duration of the warming-up period, the setting of dampers, etc., and as a general rule it has been found most satisfactory to allow them to follow their own bents in these respects.

Experiments have been carried out to ascertain whether any advantage could be gained by stacking the wood in the kilns and by grading it according to size, but it has been found that this has an adverse effect on output, owing to the extra time required for loading.

Yields per kiln vary considerably, owing to local conditions and such factors as species of wood, wetness or dryness of the wood, and efficiency of tending. Yields of over 15 cwt. have been obtained, but the average is probably between 10 and 12 cwt. from a kiln-load of about three tons of wood. Since each kiln is usually burned twice a week the yield is in the neighbourhood of one ton per kiln weekly.

Values have increased very largely above pre-war levels, at which Scandinavian charcoal was readily available at about £6 per ton ex-quality. Today some granulated grades realise up to £30 per ton.

Special Grades of Charcoal

One of the chief war-time developments was the production, after much experimental work, of a special grade of charcoal suitable for the manufacture of carbon bisulphide. For this purpose only certain selected species of wood are suitable (principally beech, birch, chestnut and hornbeam), and the charcoal has to be screened to eliminate all material below half an inch in size. For this process there was devised a motor-driven screening machine with a cyclone fan to extract the dust, and in some of the smaller operations ordinary potato-grinding machines, with slight adaptations, are being used successfully.

The demand for softwood charcoal is limited, but five or six tons of charcoal made from pine and larch are produced each week to special order. This is used in conjunction with acetylene to form a porous mass for navigational lighting.

The charcoal employed during the war for producer gas units was graded to a size-range of 3/16 to 1¼ in., and on the whole it was found that the species suitable for making carbon bisulphide gave better results than, say, oak, as they have less tendency to break down into dust in the hopper.

Fairly satisfactory results were obtained with these lorries, particularly after a cyclone fan had been fitted to extract dust from the gas on its way from the hopper to the engine.

ITALIAN CHEMICAL JOTTINGS

(From our Italian Correspondent)

OUTPUT of Portland cement in Italy exceeded 350,000 metric tons during August. This is an increase over previous months, and is due to the improvement in coal supplies, which, if they are maintained, will enable the production of cement in Italy soon to reach the pre-war figure. Despite the reported extra 50,000 tons of cement on the market during August, demands still exceeded supplies.

* * *

The products of the Italian ink industry continued to be produced in amounts sufficient for the country's needs. Great strides have been made in improving the quality of inks, especially as work in this direction is now unhampered by German competition.

The output of printing and other special inks is also adequate and in this connection it is interesting to note that numerous requests for printing inks are reaching Italy from South American countries.

* * *

Italian soap manufacturers are gradually increasing their production, though very little is being accomplished in the way of exports. This can be explained by the fact that they have always been obliged to import a great deal of the fats they need, and especially palm and coconut oils as well as some potassic salts and colophony. In 1939, for instance, the Italian soap industry consumed about 1,700,000 metric tons of fats, 830,000 tons of which were imported and the rest supplied by animal products of the country and residues from the olive oil industry.

It has been expected that imports of industrial fats would reach about 60 per cent of the pre-war figure this year, but in reality only small quantities arrived and the industry has had to rely on 36,000 tons of local fats. This is the more aggravating as Italian soap plants are capable of giving maximum outputs, not having suffered very much damage during the war.

* * *

The 59,000 tons of industrial fats which were assigned to Italy by I.E.F.C. but not collected owing to the shortage of currency with which to pay for them, have not been lost but incorporated in a new assignment. The problem of finding money to pay for copra, China wood, and oils, however, which Italy is to import from Dutch Indies, India, China, U.S.A. and other countries, still remains unsolved. Representatives of private firms are striving to induce the Government to leave the solution of this problem to private importers. The Government is reluctant to do this for it may influence prices unfavourably. In the meantime a number of applications for import licences have been filed.

Synthetic Phenol and Chlorobenzene

German Processes Fully Described

THE Office of Technical Services of the United States Department of Commerce has just released a report covering a comparative study of three processes used in Germany for manufacturing synthetic phenol and a description of the manufacture of chlorobenzene at I.G. Farben plants. Only the chlorination and sulphonation processes were used in Germany for large scale phenol production, the report states. The Raschig process was used early in the war on a pilot plant scale only.

Of the two major processes, the chlorination is regarded as the simpler and more direct. In this benzene is chlorinated to produce chlorobenzene which is then hydrolysed to phenol with aqueous sodium hydroxide at high pressures and temperatures. The process as carried out at I.G. Farben's Leverkusen plant is fully described in the report in the fullest detail.

Higher Yields

In the second major process, sulphonation, also studied at Leverkusen, benzene sulphonic acid is treated with excess 100 per cent sulphuric acid and fused with sodium hydroxide at high temperatures in open pans to give phenol. This process is the classical one, and its economy largely depends on the market demand for sodium sulphite, the by-product of the process. Although yields are higher than from the chlorination process and operating costs lower, the process is more complex and requires more floor space.

The following phases of the sulphonation process are discussed: sulphonation, sulphite treatment, neutralisation with calcium carbonate, evaporation and drying, fusion, recovery of sodium sulphite, treatment with sodium bicarbonate, carbonation, crude phenol treatment, extraction, phenol distillation, operating data, and apparatus.

The report discloses that the Raschig plant at Ludwigshafen, where the Raschig process was developed, has been completely destroyed by Allied bombing. Moreover, the plant had shut down in 1942 after having been compelled for a time to produce synthetic phenol for the government at a loss. The maximum output of the pilot plant had been about four and a half tons a day.

In the Raschig process, chlorobenzene was made by the catalytic reaction of hydrogen chloride, benzene, and air. The chlorobenzene was subsequently hydrolysed at high temperatures by steam in the presence of a catalyst, producing phenol and regenerating the hydrogen chloride. The process involves two reactions, each of which operates at a low conversion per pass. It is the most efficient of the three processes in the consumption of raw materials, but involves serious corrosion problems. Chlorination, hydrolysis of chlorobenzene, and operating data connected with the Raschig process are discussed in the report.

Continuous Production

The investigators also studied a continuous process for making chlorobenzene at the I.G. Farben Hoechst plant and a batch method process at the Leverkusen plant: Most chlorobenzene production was by the batch method but the continuous method was more efficient since it had the advantage of a very simple type of construction which eliminated internal coolers in the reactors and required less floor space. A defect of the continuous process is that the ratio of production of chlorobenzene to dichlorobenzene is low. This was no disadvantage providing there was a market demand for dichlorobenzene. Both processes are fully described in the report, No. PB-76032: *Phenol Manufacture in Germany*, 64 pp., including eight drawings, available in photostat form at $5 and in microfilm at $2 from the Office of Technical Services, U.S. Department of Commerce, Washington 25 D.C.

BUSINESS EFFICIENCY EXHIBITION

The Business Efficiency Exhibition, which, as announced in THE CHEMICAL AGE a fortnight ago can be seen at Olympia from October 1 to 11, has been opened by Sir Stafford Cripps.

Commenting upon the fact that nine years have elapsed since the last exhibition was held, the organisers—Office Appliance Trades Association—emphasise that they are aware that a new generation has now entered industry and commerce, and that "the juniors of 1938 are the managers of today."

OFFICIAL NOTICES

By an amendment of the Maximum Prices Order, manufacturers who print P.V.C. sheeting which they do not themselves calendar are now entitled to receive a margin of 14.29 per cent on cost (12.5 per cent on returns). The cost of processing (embossing, moulding, pressing, perforating, etc., may now be included in calculating maximum prices. The changes are detailed in P.V.C. Sheeting (Maximum Prices) (Amendment) Order (S. R. & O., 1947, No. 2059—H.M.S.O. 1d.).

Indian Chemical Needs

Inadequate Home Production of Essentials

THE domestic sodium and potassium meta-bisulphate industry has failed in its application for Government protection from outside competition. The Indian Tariff Board, reporting on the application, has expressed the view that the industry in India does not fulfil the first requirement—that it should be established on sound business lines. The Government decided to accept the report and to remove existing import restrictions.

Caustic Soda Outlook

The annual consumption of caustic soda in India during the pre-war years was 20,000 to 25,000 tons. During the war the demand for this product increased more than two-fold, roughly about 55,000 tons. With the anticipated development of rayon, hydrogenated oils, paper and pulp, and soap industries, during the ensuing years of rapid industrialisation, it is expected that the consumption of caustic soda would reach 120,000 to 150,000 tons a year.

Against this possible consumption, India's productive capacity is very low at present. Leaving out the cases of plants attached as auxiliary units to some of the paper factories in the country, the total annual production capacity of caustic soda plants in India is about 6000 tons of electrolytic caustic soda and an equal amount of causticised caustic. The present annual total production of caustic soda is 12,600 tons, as against the total consumption of 54,000 tons. The rest is being imported.

New Plants

There has been intense activity in India for the last two years for putting up additional plants to increase caustic soda products. Taking into account three leased plants, the licences already granted for the plants in Bombay and one in Mysore State and the permission accorded to one of the present manufacturers in South India to duplicate the capacity, the future estimated capacity of all the plants would be about 24,000 tons. This still falls considerably short of India's annual requirements.

Chlorine has been used in India only for disinfection, sanitation purposes, and textiles. With the development of paper manufacture, the consumption of chlorine for pulp bleaching has been on the increase, but a number of paper factories have their own arrangements for generating the chlorine required. The imports of chlorine, both free as liquid chlorine and in the form of bleaching powder, have been estimated at about 10,000 to 12,000 tons.

It may be expected that with the founding of more paper factories, textile mills, etc., consumpion would soon be doubled, bringing the total consumption in India to about 20,000 to 25,000 tons. In addition, the demand for chlorine for the manufacture of organic chlorine compounds, principally DDT, Gammexane and chlorinated solvents, may be expected to consume an equal amount.

Taking all things into consideration, the estimated annual chlorine consumption in India during the coming years may be reckoned at about 45,000 to 50,000 tons.

Ammonium Sulphate

The production of ammonium sulphate in India in 1945-46 at 21,000 tons was less than the average of 25,800 tons for the war period but higher than the pre-war figure of 15,000 tons. The provisional figure of production of sulphuric acid also at 480,600 cwt. showed a downward trend as compared with the average of 815,000 cwt. for the war period of 512,000 cwt. in 1938-39.

The fall in the production of ammonium sulphate continued in the first nine months of 1946-47 also when production was 16,100 tons, 800 tons less than in the previous year.

GAS PRODUCTION (*continued from page 457*)

to adopt a high-pressure purification process, by which the by-products are recovered in a complete and inexpensive way.

Seeing that in the future the large units will be interconnected and, at the same time, integrated with the existing coke-oven plants, it will be possible to attain a production in all these plants of a gas of similar quality.

The fluctuations in consumption due to seasonal changes, which as far as the domestic consumption is concerned seem to be unavoidable, can be smoothed by a combination of industries merely by adjustments of the internal gas distribution, changes which can be effected either by making a smaller quantity of producer gas, or by temporary increase of the consumption of coke-oven gas by the power station department.

The security of an uninterrupted delivery of gas for public supply under all conditions has been largely enhanced in a very economical way, namely, by connecting this gas supply with these big industrial combinations which themselves consume huge quantities of gas.

ATOMIC ENERGY

British Reports Released

A SECOND list of 25 reports from the Government's secret files on atomic energy and related subjects has just been released by the Ministry of Supply. The first list, containing 73 reports, was released in March this year, and an address was given from which copies might be obtained on loan by interested responsible workers.

A change has been made, however, in the method of making the reports available to the scientific public, and copies will now be sold by H.M. Stationery Office, P.O. Box 569, Cornwall House, London, S.E.1, to whom application should be made for reports from either list. It will be necessary only to quote the B.D.D.A. number in the present list, but titles should be quoted in the case of the previous list unless the B.D.D.A. number is known. These reports are in the form of enlarged prints taken from microfilms, and the prices below are for these prints; as an alternative, films could be supplied if desired. The copyright of all such documents is vested in the Crown, and copies may not be made, nor extracts published, without the permission from H.M.S.O.

It is hoped that H.M.S.O. will also be in a position shortly to supply documents of American origin on atomic energy, and applications for these should be made to the address given above. These arrangements do not affect the method by which Canadian documents are obtained from the Plans and Publications Section of the National Research Council, Ottawa.

The British documents newly classified are as follows:

B.D.D.A. No.	Report No.	Title and Author(s)	Date	Price £ s. d.
74	Br.195	Report on experimental work on fluorine production to May, 1939. Thomson, J. W.	8/6/39	10 8
75	Br.50	Investigations on oxides of X*. Haworth, W. N.	c.Nov., 1941	1 4
76	Br.257	A new method of investigating the angular distribution of high-energy neutrons, scattered by protons. Feather, N.	27/3/42	4 0
77	Br.37	The preparation of fluorine. Ferguson, J.	22/5/42	10 8
78	Br.72	Capture cross-sections of N, Mg, S, Ca and Pb for thermal neutrons. Fenning, F. W., Seligman, H.	Nov., 1942	2 0
79	Br.89	Note on the inelastic scattering of fast neutrons. Feather, N.	14/11/42	3 4
80	Br.310	Neutron-produced radioactivity in relation to the detection of high-energy neutrons: maximum sensitivity of a Counter. Feather, N.	26/11/42	2 0
81	MS.13	Equilibrium time in a separation plant. Peierls, R.	—	8 0
82	MS.15	Effect of a stationary layer of thickness b in front of the diffusing membrane. Peierls, R.	—	8
83	MS.17	Separating effect of a passage through capillary. Peierls, R.	—	2 0
84	MS.21	Effect of boundary layer for swept membranes. Fuchs, K.	—	8 8
85	MS.39	Clusius-Dickel device as gland. Peierls, R.	—	4 0
86	MS.P.2A (Revised version of MSP.2)	Critical conditions in neutron multiplication. Pryce, M. H. L.	—	2 8
87	MS.85	Effect of a scattering container on the critical radius and time constant. Fuchs, K.	—	10 0
88	Br.106	Preparation of metallic X* by electrolysis of the fused salts. Haworth, W. N.	—	1 4
89	Br.199	The "Metalectric" furnace (with sketch). Tomlinson (Metalectric Co., Ltd.). Haworth, W. N.	—	2 0
90	MS.88	Note on the compression at the diffuser entry in compressor I.Z.I. Friedlander, F. G.	recd. July, 1943	6 0
91	Br.393	Density of resonance neutrons in hydrogeneous media near the source. Booker, D. V., Broda, E., Kowarski, L.	Jan., 1944	14 8
92	Br.448	Receiving time and counting errors in discriminators and scaling units. Cranshaw, T. E.	18/1/44	10 8
93	Br.391	Distribution of slow neutrons in rarefied hydrogeneous media. Kowarski, L., West, D.	Feb. 1944	16 8
94	Br.469	The determination of X* in urine. A proposed modification and some notes on the method. Jones, A. G.	3/8/44	2 8
95	MS 115	A new method of determining the time constant of a sphere in a container. Wilson, A. H.	16/8/44	6 0
96	BI.68	Extraction of protactinium from a silicaceous raw material. Broda, E., Wright, P. K.	March, 1946	2 0
97	MS.12A (Revised version)	Separation of isotopes. Peierls, R., Fuchs, K.	25/2/47	10 0
98	Br.732a (Revised version of Br.732)	The spectrographic analysis of uranium. Walsh, A.	March, 1947	10 0

* Uranium

LEATHER CHEMISTS' CONFERENCE

Support for Widened Research

THE greatly widened field which chemists have developed in the service of the leather industry was reflected by the paper presented at the recent annual general meeting in Leeds of the International Society of Leather Trades Chemists, British Section. The international interest in the meeting was shown by the attendance of a number of overseas delegates, including M M. Queroix, Vignon and Comte, of the French Society of Leather Trades Chemists, and Mr. A. E. Norton, treasurer of Australian Section, who were welcomed by Mr. F. H. Quinn.

The president awarded the Donald Burton Prize for 1947 to Mr. K. Mclaren for his paper entitled "Investigations into the Degreasing of Sheepskins," and in doing so paid a tribute to Dr. Burton for his work in connection with the British Section.

Research Levy Suggested

The need for continued fundamental research by chemists freed to devote themselves exclusively to the work was stressed in a paper by Mr. G. W. Odey on "Industrial Research," in the course of which tribute was paid to the great advances brought about through the pioneer work of Sir Robert Pickard, the late Dorothy Jordan Lloyd and the late Prof. H. R. Procter. The speaker emphasised that industrial research on a big scale was more than ever necessary in order that British industry should compete in export trade with the U.S.A., in which country industrial research had made enormous strides. Research could not be done "on the cheap." It demanded the best brains. With regard to organisation in the leather industry, some form of co-ordinating body linking up with trade federations, research associations and the Export Corporation was favoured. Mention was made of the stimulus already given by this latter body, including financial grants. Finance for research, the speaker suggested, might be supplied through a compulsory levy. The opportunities for progress were enormous and they required more money than any system of voluntary contribution was likely to provide.

The following technical papers were presented in the course of the meetings: "Research in the Tannins of Sumach and Mimosa" (K. S. Kirby and S. N. Catravas); "The Proteins of Muscle Fibril" (Kenneth Bailey); "Some Aspects of Complex Formation in Basic Chromium Sulphate Solutions" (D. A. Plant); "Recent Developments in the Control of the Vegetable Tanning Process" (M. P. Balfe); and "Some Day-to-Day Chemical Engineering Problems in the Leather Industry (G. W. Douglas).

LINSEED SUBSTITUTE NEGLECTED

Rubber Seed Could Relieve Shortage

THE shortage of linseed oil could be substantially relieved if a determined effort were made to bring to this country the very large stocks of rubber seed which are available in Malaya and Ceylon. This fact was confirmed by Dr. L. A. Jordan, director of the Teddington Paint Research Station, in a statement to THE CHEMICAL AGE. While no exact figures existed, said Dr. Jordan, it was probable there were available some half-million tons of rubber seed in S.E. Asia which might be capable of affording about 25 per cent of that quantity of oil, which for some purposes would be an efficient substitute for linseed, with a solvent value of about 140.

New Method

A deterrent to the wider use of rubber seed in the past had been the deterioration brought about in the seed by enzyme action. It has now been established, however, that this can be arrested if the seed is dried at 100°C. The principal difficulty now, he said, was to initiate any effective action towards the large-scale collection of this valuable raw material which could make a useful contribution towards solving the current difficulties of paint manufacturers.

There were, Dr. Jordan emphasised, some objections to any attempt to substitute rubber seed for linseed as a long-term policy, among them being the comparatively high costs of collection resulting from the rising costs of coolie labour and the changing methods of cultivation, encouraging the growth of cover crops in the rubber plantations. He agreed, however, that in view of the high level of linseed oil prices and the world shortages there was no excuse for neglecting the rubber seed stocks which could now be readily secured.

Control of Chemists

AT the time of going to press the position of the industrial chemist in relation to the new Control of Engagement Order is no less obscure than it was a week ago. Although the "clarifying list," to which reference was made in our issue of September 26, has since become available, the time-honoured profession of chemistry is regrettably omitted. In an endeavour, therefore, to seek a clear ruling, THE CHEMICAL AGE has made last-minute inquiries of the Ministry of Labour. Their reply is to the effect that the position of the qualified chemist in industry is still under consideration, and that his and other professions similarly unclarified may form the subject of a press conference at the Ministry soon.

FRENCH OILS AND FATS

WORK OF THE NEW RESEARCH CENTRE

IN France, as elsewhere, the vital importance of oils and fats in world economy to-day has long been realised, and the new research centre in Paris (Inst. de Recherches pour les Huiles de Palme et Oléagineux) with the active support of the Government, especially the Colonial Ministry, is vigorously pursuing its task of collating existing information and opening up fresh fields of research. While collaborating with the old-established Inst. Colonial de Marseille, whose *Bulletin des Matières Grasses* it has taken over and publishes under the new name *Oléagineux*, it nevertheless undertakes a large and progressive programme of its own in oils and fats technology, economics, and trade. In recent months it has devoted considerable attention to the ambitious schemes of the Colonial Ministry, through the Commission de Modernisation, for increasing oils and fats production in the French African colonial territories and at home; but it evidently aims to cover the whole vast field of oils and fats technology, from the scientific cultivation of oil plants and trees to the intricate chemistry and physics of the fatty products. Some results have been already published, and the following is a brief summary taken from *Oléagineux* during the first half of 1947. (References are to months and pages.)

Soil Studies

In the first of a series of studies of tropical soils, with special reference to oil plant culture, Professor H. Erhart (June, 293-303), a pioneer in pedological science, deals with those of the Sudan and Madagascar to illustrate more particularly the nature of lateritic clays and other formations. In the virgin forest area of eastern Madagascar several zones or horizons overlying the original granite or gneiss are distinguished. Alteration of this original mother rock has resulted for the most part in lateritic clays which have lost much if not all their alkaline or alkaline earth bases, K, Na, Ca, and Mg, as well as most of the Si. The tropical conditions under which this and other changes take place, and the nature of these changes, with particular references to the red soils of Madagascar are discussed; the earlier work of Perrier de la Bathie in his book 'Vegetation Malgache" and the phyto-geographic studies of Professor Humbert are also noted.

In the Great Island as elsewhere there has been much deforestation by fire or otherwise and consequent denudation of soils except where protected to some extent by the great ravines or lavakas. The red soils or lateritic clays are more or less typical of the forest or pre-forest areas of French tropical Africa, and where denuded, are of doubtful fertility. Careful soil surveys are obviously necessary before any grandiose schemes of oil-plant cultivation are initiated. The author concludes this first part of his studies with an account of the so-called podzols and Orstein soils, including samples from Madagascar, the Sudan, and the Middle Niger. Some fine illustrations accompany the text. (See also P. Michaux on soil surveys for oil-palms—Feb., 82-3.)

Oil-Palm Physiology

Under the heading "Floral Biology of Palm Trees," P. Henry, chief botanist at the Institute, describes the physiology of the various palms: oil palm, coconut palm, date palm, and others, including numerous illustrations. (May, 233-241.) The subject may be sub-divided into (1) morphology of the floral organs; (2) distribution of sexes; and (3) pollination, with its physico-chemical aspects, and the part played by natural agents such as wind and insects.

M. Ferrand, Director of the Research Centre, bases the greater part of his discourse on "Culture of the Oil Palm," on experience gained in the Far East (Malaya and Sumatra) and in the Belgian Congo. (Jan., 1-10.) On the east coast of Sumatra the area under oil-palm cultivation has increased from 4000 hectares in 1918 to 104,000 hectares in 1940. Although soil and climate in the East are said to be much more favourable than in Africa, scientific culture on the plantation system has been the most important factor. Yields of oil (presumably palm oil and excluding kernels) after the eighth or ninth years attained 1½ to 2 tons per hectare but these declined for a time through various disquieting causes during 1920-24, and a thorough study was made of cultural conditions, especially nitrogen intake and need for organic matter in the soil. As a result, yields began once more to increase. Special study was made of fertiliser requirements, and also of plant selection. The best fertiliser mixture per palm was found to be 2 kilos ammonium sulphate, 2 kilos basic slag, and 1 kilo concentrated (48 per cent. K_2O) potassium chloride. In these soils of the Far East, potash is not usually lacking and may often be omitted from the fertiliser programme. Under favourable conditions and after care-

ful selection the yields on some plantations, after 8 to 10 years' growth, exceeded four tons of oil per hectare. Special attention has also been given to intercropping among the palms with cover crops in order, among other things, to maintain the nitrogen content of the oil and especially the carbon-nitrogen ratio. The results obtained in the East stimulated work on similar lines in the Belgian Congo and the establishment, in 1933, of the I.N.E.A.C. (Inst. Nat. pour l'Etude Agronomique du Congo Belge). By 1939, oil-palm culture under the plantation system was 60,000 h. of which about one-fourth was planted by the natives. And finally on the basis of all this work in Asia and Africa, the Institute in Paris (I.R.H.O.) has in hand a large programme of intensive research on oil-palm cultivation.

Oil-Palm Pests

Oil-palm pests are described by Th. F. Le Stanc, chief entomologist of the Institute. (Feb., 59-67.) They are mostly insects, but include also the palm kernel rat (rat palmiste) and a small bird, of the Weaver group (Tisserin). Insects of many kinds attack the oil-palm and are described in some detail together with appropriate insecticides for the different groups. So far as the plantations are concerned the best preventive is sound cultivation, pruning, weeding, and so forth; but this of course is less applicable in the native forests. Among the most effective chemical remedies are specified arsenic in some form or other, and derris root (rotenone). A formula commonly used in the East Indies comprises 0.3-0.4 per cent powdered derris, titrating 10 per cent rotenone, together with 1-2 per cent talc.

H. Pech and P. Henry (March, 139-143) give a brief account of experimental work on accelerated germination of oil-palm seeds at the Pobé Station in Dahomey, in which a small hot-house of special type was used, at fairly constant temperature of 35°-40°C. and saturated atmosphere. The interesting fact emerges that by periodical exposure to lower temperature, say down to about 25°, by placing the seed-boxes outside in the shade, rate and extent of germination was considerably augmented. In one case a 98.2 per cent germination was attained. Experiments are being continued to determine definitely the optimum conditions.

In an article on the "Autoxidation of Fatty Acids (mono-ethylenic) and their methyl esters by Ch. Paquot (Jan., 15-19) work on this subject is reviewed.

Professor J. J. Trillat, writing on "X-Rays in the Study of Fats (Part I, Feb., 68-75) points out that advantage has been taken of the orientated crystallisation of fatty bodies to apply the methods of X-ray

Polish Chemical Exports

POLISH chemical exports during July and August have included 700 tons ammonium, 300 tons sodium hydroxide, 145 tons calcium chloride and 300 tons sodium carbonate to Russia; 240 tons of zinc white to Norway, 220 tons to Sweden, 180 tons to Holland and 70 tons to Denmark. Hungary received 20 tons trichlorethylene; 2220 tons of tar were shipped to Yugoslavia, Switzerland and the Russion zone of Germany.

Oilfield output for August reached 11,170 tons of crude petroleum giving 5050 tons petrol after refining; natural gas production was 9,235,000 cubic metres. Recent expansion in natural gas production has been sufficiently great to render possible the commencement of a new pipe line being constructed between Debowice to Cieszyn (Tieschen) Lower Silesia.

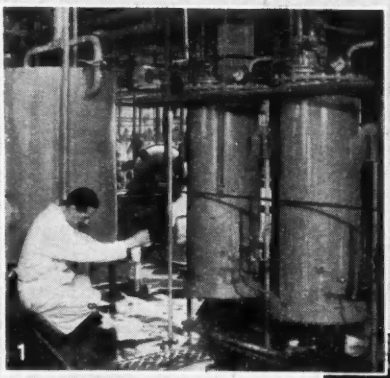
Exploration for new oil fields in the areas north of the Tatra Mountains is officially said to be meeting with considerable success. New borings in the Province of Crakow have been particularly promising and there is every liklihood of considerable development in the course of the next few years.

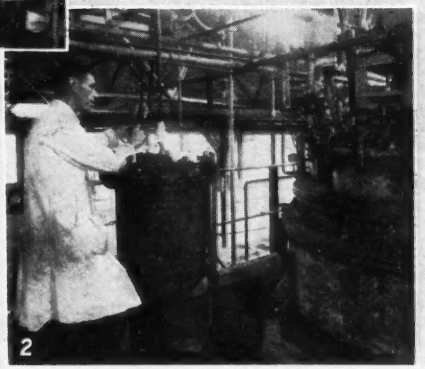
NEW VARNISH PLANTS

One of the most modern and efficient varnish factories in the world has been officially opened in Montreal by the Sherwin Williams Company of Canada. Part of the company's $2,500,000 expansion programme, the plant is designed to produce alkyd-type resins used in the manufacture of modern varnishes for industrial, marine, aeroplane and maintenance finishes; vegetable oils and similar products will also be produced. The new factory, which is located near the company's office building in the city, is the largest of its kind in Canada, and contains equipment capable of producing 1,500,000 gallons of varnish per year; it is designed ultimately to reach a production of 3,000,000 gallons annually. Including its auxiliary units it occupies approximately two acres, and is one of the largest industrial consumers of gas in Montreal.

(*Continued from previous column*)

diffraction to their investigation. In this first part of a paper read at the Institute in April, 1944, the author described the method of orientated layers and results thereof, including size and structure of molecules, structure of hydrocarbon chains, and treated in some detail normal hydrocarbons, normal fatty acids, their derivatives (soaps, etc.), polymorphism, mixtures, and the crystalline structure of fatty acids.





STREPTOMYCIN

The first commercial samples of streptomycin have been made by Boots Pure Drug Company in Nottingham. The photographs on this page show the streptomycin plant, which has many points in common with the plant for the production of penicillin.

1. Spores being introduced into the tanks for preliminary fermentation. 2. Transferring Actinomyces mould to the main fermentation tanks. 3. Some of the large fermentation tanks. 4. Charcoal with absorbed streptomycin from filter presses being mixed with alcohol. 5. The final product in a sterile powder form.

COAL ALLOCATIONS BUNGLED

Effect on Coke Oven Plants

DISASTROUS consequences are bound to ensue if the National Coal Board differentiates in allocations of coal between gas supply undertakings and coke ovens that sell their gas to the gas industry. This is the view put forward by Col. W. Moncrieff Carr, O.B.E., T.D., managing director of the United Kingdom Gas Corporation, in a letter published by *The Times* last week.

Through such differentiation, Col. Carr recalls, hundreds of industrial firms in West Yorkshire were unnecessarily deprived of gas for a time during the recent dispute in the Yorkshire coalfield.

The consequent dislocation and loss of production arose through the announcement last week by the National Coal Board that all coke ovens in Yorkshire would be required to cut their throughput of coal by 45 per cent, irrespective of whether they sold their gas to gas undertakings or not.

Col. Carr suggests that those announcing the cut were not aware that coke ovens in many instances form to-day an integral and important part of the gas industry, especially in Yorkshire where a vast gas grid supplying 17 towns in the West Riding draws the bulk of its supplies from three coke ovens.

EXPLOSIVES INSPECTORS' REPORT

BECAUSE of the increasing use of acetylene under pressure in a range of industrial chemical processes, which were stimulated by work performed in Germany during the war by Dr. Reppe, special attention is paid in the newly-issued 1946 annual report of H.M. Inspectors of Explosives (H.M.S.O., 1s. net) to the risks involved in the uses of this source of plastics, textile fibres, and dye intermediates.

The inspectors have consulted with a number of firms employing acetylene under pressure, with the Association of British Chemical Manufacturers and the British Acetylene Association, and a new Order in Council has been drawn up under the Explosives Act, 1875, to regulate safety measures.

QUARRYMEN'S WAGES

Significant results of an unrestricted production scheme aided by an unlimited bonus structure are reported from Graseby, Lincolnshire, where at one of the principal lime quarries in the country, workers whose standard rate is only 1s. 10d. an hour have earned in some cases up to £20 in a week on a tonnage-bonus system. Many quarrymen regularly receive £14 in a week.

TO STUDY PROFIT MARGINS

New Committee Set Up

THE Board of Trade has now announced the constitution of the committee which, under the chairmanship of Mr. G. H. Lloyd Jacob, K.C., is to study the practice of resale price maintenance and the methods by which minimum wholesale and retail profit margins are fixed, "and to report whether, in the light of present conditions and particularly of the need for the maximum economy and efficiency in the production and distribution of goods, any measures are desirable to prevent or regulate its continuance."

Members of the committee will be: Mr. J. R. M. Brumwell, managing director and proprietor of the Stuart Advertising Agency; Dame Anne Loughlin, Trades Union Congress; Mr. John Ryan, M.C., vice-chairman of Metal Box Co., Ltd.; Mr. H. G. Sharp, formerly manager and actuary of the Scottish Widows' Fund and Life Assurance Society; Mr. Henry Smith, vice-principal of Ruskin College Oxford; Mr. R. E. Yeabsley, Hill Vellacott & Co., C.A., and Accountant Adviser to the Board of Trade.

FIRE PROTECTION

New Benn Journal

BENN Brothers, Ltd., Bouverie House, Fleet Street, London, publishers of THE CHEMICAL AGE, have acquired from Lomax Erskine & Co., Ltd., the proprietorship of the monthly journal *Fire Protection and Accident Prevention Review*, and of the *Fire Protection Year Book*. The October number of *Fire Protection* will be issued under the Benn imprint.

Founded in 1938 with an eye to the need for a wider diffusion of up-to-date technical knowledge of fire fighting, and to assist the fire service in its task of reorganising to meet the expected ordeal of heavy air raids, *Fire Protection* has become well established as a paper for officers of the N.F.S., industrialists, business men, local and national Government officials and works safety officers interested in the better protection of life and property from fire. To the task of providing information and guidance on fire prevention and fire fighting and the administration of fire services, it has, since the war, added that of furthering safety and accident prevention in industry at large.

Mr. Basil H. Tripp, a director of Ernest Benn, Ltd., who served in the auxiliary and National Fire Services from 1938 to 1945, has been appointed editor.

FATAL ACCIDENT WITH CYANIDE

COURAGEOUS action and presence of mind of Mr. D. W. Hivey, of the Hivey Fumigation Co., Cheapside, Liverpool, and of Mr. T. W. Clarke, a manager, mitigated the effect of an accident last week with cyanide gas at the company's store in which one workman lost his life. While the gas was being decanted from a 75-lb. cylinder an escape developed. One man received the full effects of the gas and staggered, blinded, into the back of the store. The other tried to reach the open air, but collapsed. Mr. Hivey and Mr. Clarke went to their help. After throwing the cylinder into a gas-tight chamber and shutting it off, they tried to reach the man in the back of the store. The fumes overcame Mr. Hivey, but Mr. Clarke managed to get both men into the fresh air. Other workers brought oxygen cylinders and masks from the office and gave oxygen to the three men, Mr. Hivey recovering sufficiently to direct operations. The supply of oxygen was maintained in the ambulance to the hospital, but on arrival one of the workmen was dead. The Hivey Fumigation Company are employed in fumigation work on board ships.

ELECTRON JUBILEE

IN connection with celebrations marking the jubilee of the discovery of the electron by Sir J. J. Thomson at Cambridge in 1897, the Institute of Physics and the Physical Society, in collaboration with the Institution of Electrical Engineers have opened an exhibition at the Science Museum, South Kensington. It is to remain open for at least three months, and may be visited between the hours of 10 a.m. and 6 p.m. on weekdays and from 2.30 p.m. until 6 p.m. on Sundays.

Forming part of and in conjunction with the celebrations, Sir Clifford Paterson gave a lecture entitled "The Electron Liberated" on Thursday, September 25, at the Central Hall, Westminster.

Prices Too High

Addressing the 23rd ordinary general meeting of Geo. Cohen, Sons & Co., chemical engineers, in London last week, Mr. Cyril M. Cohen (chairman and managing director) said: "It seems that the prices of high-grade British engineering products are becoming less favourable when compared with their Belgian, Czechoslovakian, Italian and French equivalents, all of which are beginning to make themselves felt in export markets. British prices will have to be reduced if we are to keep our hold on the export trade and increase its volume, as is so imperative."

NEW METAL-DRYING LIQUID

Water Extraction

A THIN, water-shedding liquid for drying metals is reported to have been produced in the U.S.A. The new liquid, which is described as "thin and mobile," is called "Hydrex," and is said to have a very high penetrating power to enable it to displace water from blind holes and crevices. The drying procedure consists of immersing the metal in the liquid where the water is automatically extracted. When this process is complete, the metal is removed. It is now covered with a thin film of solvent which quickly evaporates to leave a completely water-free surface with some rust-inhibiting properties.

The liquid has been used for the drying of plated work such as chrome, silver or cadmium which often exhibit corrosive tendencies with age. It also disposes of spots that normally remain on the work from solids dissolved in the water, such as chromic acid or from the solids in hard water. The water extracted from the metal by the new liquid sinks to the bottom where it can be drawn off periodically.

UNDERGROUND GASIFICATION

ACCORDING to *The Times* Brussels correspondent, Belgian engineers have just returned from Italy where they conducted experiments in the underground production of gas.

The experiment was carried out in a lignite seam containing 55 per cent moisture and, in its dry state, 25 per cent ash. Gasification of the seam produced 7,000,000 cu. ft. of gas each day of 1000 calories per cu. ft., or about 24 cu. ft. of gas per lb. of raw lignite. In the opinion of the engineers, this result proves the scientific soundness of the making of gas underground as a new principle of mining practice, and they claim that it is applicable to peat as well as to coal and lignite.

New U.S. Cartel Conspiracy Alleged

Three leading United States glass manufacturing companies, *viz.*: Corning Glass Works, Corning, N.Y., the Owens-Corning Fiberglass Corporation and the Owens-Illinois Glass Co., both of Toledo, have been charged by the United States Department of Justice with conspiracy to dominate and to control the American fibre glass industry. They are, moreover, being accused of concluding cartel agreements with foreign manufacturers to strengthen their American monopoly position. The District Court is being requested to split up Owens Corning so as to establish competitive conditions in this industry.

Next Week's Events

MONDAY, OCTOBER 6

Society of Chemical Industry (London Section). Burlington House, Piccadilly, W.1, 6.30 p.m. Dr. J. W. Walker: "Synthetic Drugs in the Fight against Tropical Diseases."

TUESDAY, OCTOBER 7

Textile Institute (Bolton Branch). Municipal Technical College, Manchester Road, Bolton, 7.30 p.m. J. Shepherd: "British Export Trade under Post-War Conditions."

WEDNESDAY, OCTOBER 8

Fuel Luncheon Club. The Engineers' Club, Albert Square, Manchester, 12 noon. Opening meeting of the 3rd Annual Session. Mr. R. Alan S. Thwaites: "Staggering—and all That."

Society of Chemical Industry (Food Group). Burlington House, Piccadilly, W.1, 6 p.m. E. F. Gall: "Microbiological Proteins—their Synthesis, Production and Feeding Value." H. J. Bunker: "Production for Foodstuffs." J. A. B. Smith: "Production in the Rumen." R. Braude: "Food Value for Animals." B. S. Platt and R. A. Webb: "Use for Human Food."

Society of Chemical Industry (S. Wales Section). Physics and Chemistry Lecture Theatre, University College, Cathays Park, Cardiff, 7 p.m. H. W. Cremer: "Water—a National Asset." (Jubilee Memorial Lecture).

THURSDAY, OCTOBER 9

British Association of Chemists (Liverpool Section). Lecture Room, Radiant House, St. Helens, 7 p.m. T. C. Pickering: "Optical Glass."

Chemical Society (N. Wales Section). Lecture Room, Department of Chemistry, University College, Bangor, 4 p.m. Sir Ian Heilbron: "DDT and Gammexane in the Control of Insect-borne Diseases."

Oil and Colour Chemists Association. Lecture Theatre, The Royal Institution, 21 Albemarle Street, W.1, 6.30 p.m. Sir Lawrence W. Bragg: "A Review of Recent Advances in X-Ray Analysis."

Recent Progress in Geological Investigations and Mineral Developments in the Colonies. Cinema Hall, Imperial Institute, South Kensington, S.W.7, 3 p.m. 8th Lecture. S. H. Shaw: "The Geology and Mineral Resources of Palestine."

Scottish Engineering Students Association. Institution of Engineers and Shipbuilders, Glasgow, 7.30 p.m. Sir James Lithgow: Presidential Address.

Chemical Society (Manchester Section). Chemistry Department, The University, Manchester. D. F. Fairbrother: "Inorganic Catalytic Halides."

(Continued at foot of next column)

STEEL PLAN FOR RHODESIA

WITH a view to commencing the large-scale production of steel, Sir Dennistoun Burney, acting on behalf of the Firth-Brown steel combine, is reported to have acquired a mineral concession in Northern Rhodesia from the British South Africa Company. The area thus obtained for prospecting is stated to be approximately five times the size of Wales; is said to contain many hundreds of millions of tons of iron ore, and will cost many millions of pounds to develop.

The richest deposits are believed to lie about 40 miles west of Lusaka, the Northern Rhodesian capital, and bordering the Zambesi river. Plans so far envisaged include the construction of a dam across the river at Kraiba Gorge, 300 miles distant from the Victoria Falls, for a hydro-electric project.

As far as is known, the concession, which has received official approval, will eventually lead to the erection of steel mills, and later to the associated production of chrome in Southern Rhodesia.

Brazil Needs Soda Ash

Brazilian industries are reported to need supplies of approximately 3500 tons of caustic soda and 3000 tons of soda ash monthly and are at present receiving only about 50 per cent of their requirements. Soap, glass and paper factories are particularly affected by the shortage which has been aggravated by the restriction on exports of these chemicals from the U.S.A. and the reduced production in the United Kingdom. It may be recalled, that earlier this year, the Federal Government announced that financial and technical aid was being obtained from the U.S.A. to set up a plant in Brazil to produce caustic soda and soda ash from local deposits of salt and lime.

(Continued from previous column)

FRIDAY, OCTOBER 10

The Fertiliser Society. Lecture Hall, Royal Society of Tropical Medicine and Hygiene, 26 Portland Place, W.1, 2.30 p.m. Sven Nordengren: "Granulation of Phosphatic Fertilisers—Theory and Practice."

Chemical Society. London and Southampton, University College Chemical Society. Physics Department, University College, Southampton, 5 p.m. C. C. Price: "The Influence of Substituents on the Polarity of the Benzene Ring."

SATURDAY, OCTOBER 11

Institution of Chemical Engineers (North-Western Branch). College of Technology, Manchester, 3 p.m. S. G. Terjesen: "Removal of Bacteria from Air by Filtration."

Technical Publications

A CONSIDERABLE increase in the number of accidents coinciding with the wider use of milling machines during the war is given as one of the reasons for the investigation by a technical advisory committee of additional safeguards with horizontal milling machines. One of the conclusions of this committee, now published ("The Safeguarding of Milling Machines," H.M.S.O., 1s. 6d. net), is that the existing standard of fencing provided by the Horizontal Milling Machine Regulations, 1928, is inadequate. The report describes and illustrates a variety of more effective guards.

* * *

A range of position controllers suitable for operating remote mechanisms over distances varying from a few yards up to a quarter of a mile has been developed by Evershed & Vignoles, Ltd., and is described and illustrated in a new publication (No. 220). Each controller comprises a hand-operated transmitter electrically connected to one or more distant electric motors. This method of control permits considerable flexibility in the location of plant, and overcomes limitations hitherto imposed by mechanically-operated controllers.

* * *

Booklet No. 88 in the "Foundry Practice" series issued by Foundry Services, Ltd., contains a great deal of valuable information, well illustrated, on a number of casting problems associated with a variety of metals, and especially aluminium and copper alloys.

* * *

The heavy duty refrigerating plant recently shown by Peter Brotherhood, Ltd., at the Marine and Engineering Exhibition, the vertical two-stage ammonia crosshead plant, is the subject of an illustrated technical review which the company has just issued. It should be of interest to all concerned with large-scale refrigeration, the plant itself being of the same design as four which are being supplied to a new oil refinery in the Middle East.

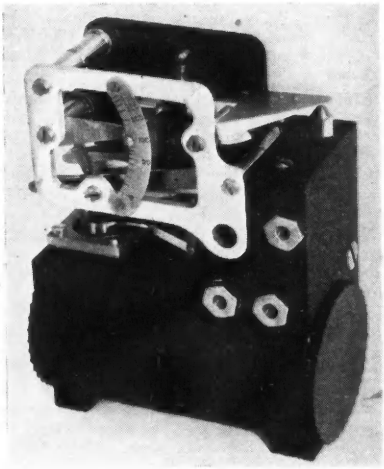
* * *

Great economies in the use of steel and a saving of possibly a million tons of coal a year could be made by the fuller use of welding for erecting steelwork structures. This estimate by the Director of Research, British Welding Research Association (Mr. A. Ramsay Moon) is recorded in the current issue of "The Welder" (Murex Welding Processes, Ltd.), which publishes several articles technically important to welders.

Further development of the technique of automatic control is seen in the new Type 2 photoelectric equipment described in a recent folder from Londex, Ltd. An important improvement is the instrument's immunity from variations of sensitivity arising from fluctuation of voltage in the mains. Changes between 150 and 270 vv. do not impair its efficiency.

* * *

Another important advance in the same direction is represented by the air-operated automatic controller (Mark 20) newly issued



Automatic Controller

by George Kent, Ltd., and fully described in literature now issued. Now available for use with the Kent ring balance meter, the temperature or *p*H control and the fluid, steam or gas flow meter, the control mechanism will detect a deviation of ±0.2 per cent.

* * *

Of interest to metallurgists is the Muirhead-Wigan decade oscillator newly released by Muirhead & Co., Ltd., who describe it in an illustrated brochure as their "highest achievement in this field." The claim is based largely on the very high accuracy of measurement of frequency steps, from 1 c/s. to 100 kc/s, of which the low frequencies are very usefully employed in vibration measurements.

Home News Items

Works Managers' Institution.—The Institution of Works Managers' has issued a programme of activities for its 1947-48 session. Copies are obtainable from the secretary, 2 Caxton Street, Westminster, S.W.1.

New Mining Machinery Ordered.—Orders for £9 millions of new mining machinery have been placed by the National Coal Board. It has been described by a Ministry of Supply spokesman as a first instalment in a mines modernisation programme that may take 14 or 15 years to complete.

Ironworks for Sale.—The "Globe" iron works, of the British and Colonial Horseshoe and Machine Co., Ltd., Walsall, which has gone into voluntary liquidation, are to be sold by auction at the Walsall Chamber of Commerce by Messrs. Belcher & Son, on October 7.

£7000 Gift from Monsanto.—Monsanto Chemicals, Ltd., have entered into an agreement with the University College of South Wales and Monmouthshire to pay the college £1000 for seven years to support a lectureship in plant physiology and botany.

Cement Prices.—Allegations that cement prices in the Liverpool area have risen disproportionately—6s. 6d. in two months and twice the pre-war figure"—were denied by a spokesman of the Cement Marketing Company in Liverpool. The present price, he said, was 79s. 6d. per ton. Pre-war cost, with bags, was 48s. ton, and two months ago it was 76s.

Cement Shortage in Liverpool.—Following reports emphasising the serious shortage of cement in the Liverpool area, a letter sent by the Ministry of Works to the National Federation of Building Trade Employers says: "In regard to the Liverpool situation the cement industry agree with us that, on any showing, Liverpool itself, as distinct from Lancashire, is probably not getting the cement it requires, and we have asked them to take immediate steps to remedy the situation."

Rising Prices.—The continued rise in wholesale prices of import and export goods in the past four months is shown by the publication in the *Board of Trade Journal* of the following index numbers of imports of raw material and un-manufactured articles: May, 268; June, 271; July, 282; August, 285. Equivalent index numbers for exports in the same category were: May, 226; June, 2227; July, 230; August, 235. Metal goods exports rose from 204 in May to 214 in August.

Montan Wax Extraction.—The British Lignite Company, Ltd., proposes to erect plant and buildings at Bovey Tracey, Devon, for extracting Montan wax from lignite. No objection has been raised by Newton Abbot Rural Council.

Visit to Evans Medical Factory.—Members of the West Lancashire and Cheshire Smoke Abatement Committee visited Evans Medical Supplies, Ltd., Speke factory, an September 22. They toured the factory, and Mr. C. M. Opie explained the method for disposing of chemical effluent and smoke.

U.K. Oil Search.—The D'Arcy Exploration Company has been granted licences to prospect 195 square miles in York, 197 square miles in Stirling, Dumbarton, Lanark, Westlothian and Midlothian, and 150 square miles in Stirling, Westlothian and Midlothian.

British Enterprise in Australia.—An exhibition attesting to the scope of industrial developments in Australia during the past two decades was opened by Sir Stafford Cripps at Australia House, Aldwych, W.C.2, this week. It is to remain open until October 25.

Objections to New Steelworks.—Because 170 residents have objected, the £7 million scheme for expansion of the John Lysaght, Ltd., steelworks at Normanby Park, Scunthorpe, has been made the subject of a public inquiry, at which the company's local chief engineer stated that the development was designed to raise the works steel output from 6500 tons to 12,000 tons weekly.

Deterioration of Penicillin.—Mr. Harry Brindle and Miss Winifred G. Keepe, of Manchester University Pepartment of Pharmacy, stated in an address at the British Pharmaceutical Conference at Torquay, last week that nine out of ten samples of commercially available penicillin which they had examined had deteriorated and that the usual containers were unsatisfactory. There was gross absorption of moisture and 40 to 80 per cent of activity had been lost by samples in containers in less than six months.

Deeside Steel Project.—Dutch engineers are removing a huge sandbank in the River Dee at Connah's Quay and pumping thousands of tons of sand and shingle a distance of two miles a week to level a site for a new steel mill. This is part of the development programme revealed last December in connection with Summers' steel works, where it is hoped to raise the capacity of the plant to 500,000 tons of steel sheets a year. The present output is between 350,000 and 400,000 tons.

PERSONAL

SIR FREDERICK BAIN, a deputy chairman of I.C.I., addressed the National Brassfounders' Association at the Grand Hotel, Birmingham, on Saturday last.

MR. P. A. WELLS, general secretary of the Society of Dyers and Colourists, has been appointed Director of Education in the International Wool Secretariat, London, as from October 1.

DR. C. J. T. CRONSHAW, a director of I.C.I., spoke at a luncheon which preceded the annual general meeting last week of the Purchasing Officers Association at the Connaught Rooms, London, W.C.

MR. R. C. STANLEY, president of the International Nickel Company of Canada, who has just been awarded the King's Medal, left this country in the *Queen Elizabeth* for New York last week.

PROFESSOR MARCUS OLIPHANT, professor of physics at Birmingham University, has just returned from a four-day visit to Norway where he has been lecturing on the subject of atomic energy.

MR. D. G. HEMMANT, Powell Duffryn Technical Services, Ltd., has left this country for Borneo as leader of a team of mining experts which his company has sent to the Island to investigate coal deposits on behalf of the Colonial Office.

MR. MICHAEL WAUGH, of Monsanto Chemicals rubber chemicals department, has received a presentation from his colleagues to commemorate the occasion of his recent wedding. During the war Mr. Waugh was an R.A.F. pilot.

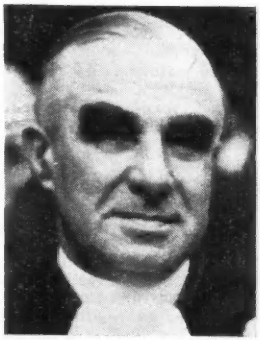
CAPT. C. T. TURNER, assistant analyst to the City of Liverpool, has retired after nearly 40 years in public analytical work. Mr. and Mrs. Turner were recently present at a farewell gathering in the City Laboratories, where they received presentations from Mr. J. F. Clark, the City Analyst.

MR. D. MAXWELL BUIST, export director of British Electrical & Allied Manufacturers' Association, has recently returned from a trip to Vienna. His visit is understood to have been undertaken on behalf of the Board of Trade, to whom he has submitted a report on the subject of the prospects for British exports of electrical goods to Austria. Mr. Buist was formerly chief electrical engineer at the I.C.I. Billingham Works.

MR. GEOFFREY HICKSON, a senior manager of B. Laporte, Ltd., and a director of their subsidiary companies—National Titanium Pigments, Ltd., Associated Phosphate Manufacturers, Ltd., and Malehurst Barytes Co., Ltd., is shortly leaving England to take an appointment as managing director of the Australian subsidiary—Crystal Laporte Proprietary, Ltd., Botany, N.S.W., and to act as general representative of the Laporte group. The Crystal Laporte plant for the manufacture of hydrogen peroxide is now undergoing extension.

The athletic distinction in the past of the president of the Monsanto Chemical Company, MR. WILLIAM M. RAND, was recalled when on holiday in England last week, he was host at Claridge's Hotel at a re-union of members of the English team with whom he competed in the 110 metres hurdles at the Olympic Games in 1908. His American team took first four places. Last week only three English competitors could be mustered and a goodwill cable was received from another in South Africa. Mr. Rand returned to the company's St. Louis headquarters last week-end.

SIR FREDERICK WELLS, managing director of Sanitas, Ltd., as forecast in THE CHEMICAL AGE of July 26, has been chosen to be the next Lord Mayor of London.



Sir Frederick Wells

Steel Company of Wales

The board of the Steel Company of Wales has appointed the following directors to executive positions: MR. R. JULIAN PODE, managing director; CAPTAIN H. LEIGHTON DAVIES, assistant managing director; MR. W. F. CARTWRIGHT, general manager (steel division); MR. T. O. LEWIS, general manager (tinplate division). The undertaking at Orbe Works, Newport, will be carried on as a wholly-owned subsidiary company to be named The Steel Co. of Wales (Lysaght Works), Ltd. The board of the latter company will be Sir Charles Bruce-Gardner, Bt., chairman; Mr. E. C. Lysaght, Mr. E. Julian Pode, Captain H. Leighton Davies, Mr. R. P. Perry.

Overseas News Items

Pharmaceutical Federation Meeting.—The 1949 general meeting of the International Pharmaceutical Federation is to be held at Brussels.

Telephone Number Change.—The telephone number of Messrs. Theodore St. Just and Co., Ltd., Whitefield, Manchester, has been changed to WHItefield 3211 (5 lines). Formerly Whitefield 2729.

New Du Pont Sulphuric Acid Plant.—The Grasselli department of the Du Pont de Nemours group has recently started operating the new sulphuric acid unit at the James River in Virginia.

Malayan Tin.—Shipments of tin from Malaya in August totalled 3180 tons, of which the U.S.A. received 1850 tons, Europe 600 tons and British Possessions 730 tons. Of the tin ore shipments of 432 tons Thailand received 296 tons and Burma 111 tons.

U.S. Steel for Near East.—The United States Department of Commerce on September 26 announced that it has approved an export licence for 20,000 tons of steel to the Trans-Arabian Pipeline Company on the grounds that Arabian oil will serve "American strategic, political and economic interests."

Alumina in Western Germany.—Production of alumina may recommence in the British Zone. The manufacture of aluminium and magnesium as well as alumina was originally to be prohibited, but it is understood that the Martins works at Bergheim, Cologne district, will now be permitted to produce at the rate of 5000 tons a month.

Development of Spanish Industry.—The progress of the Instituto Nacional de Industria (I.N.I.), a State-controlled holding concern formed to finance and develop Spanish industry, is reviewed in the Spanish Press. The activities of this institution are at present directed to (a) coal, iron and steel and other metal industries, and (b) oil, chemical, fertiliser and artificial fibre industries. It is stressed that a policy of nationalisation will not be followed.

Austrian Coal Deposit.—A new big brown coal deposit, estimated at 24,000,000 tons, has been opened in Ostermiething and Wildshut, Upper Austria. A Four Years' Plan has already been drawn up aiming at a yearly production of 800,000 tons. It is calculated that after two years 40,000 tons, and after three years 400,000 tons could be mined. The new mine belongs to the Aluminium Trust of the firm Stern & Hafferl.

Synthetic Jewels in Germany. — The Karbidwerh Freyun, in the Bavarian Forest, is the only plant in Germany turning out synthetic jewels for watches and measuring instruments.

Chemical Plant Seized.—Senior Austrian officials stated last week that the Oberdorf-Vditsberg chemical and glass undertaking in Vienna has been seized by the Soviet authorities.

Egypt to Ban Chemical Imports.—It is reported that the Egyptian Ministry of Finance has under consideration the question of banning certain industrial chemical imports with a view to protecting domestic producers.

Italy Restricting Soap Manufacture.—The Italian Ministry for Industry has caused uneasiness among industrialists in northern Italy by an order which forbids the establishment of new or extended soap factories. This order is aimed at preventing the utilisation of fatty raw materials for soap making.

South African Cement Output to be Doubled.—Plans are afoot in the Union to reach a yearly cement output of about 2,600,000 tons, *i.e.*, twice the current output, by the end of 1949. In that connection a plant is being built at Colleen Bawn, Southern Rhodesia, with an annual capacity of 100,000 tons, to start work next autumn.

"No More Nationalisation."—The United States Republican Presidential candidate, Mr. Harold Stassen, declared at a Press Conference that any future American aid to Britain should be on the condition that the British Government were not going ahead any further with socialisation plans for steel or any other industries.

Spanish Chemical Needs.—There is in Spain at present an insatiable import demand for nearly all classes of machinery, equipment, commercial vehicles, some chemicals, highly specialised products and new techniques, reports H.M. Counsellor (Commercial) in Madrid in an article in the *Board of Trade Journal*. The chemical industry has, however, expanded notably and continued very active despite short supplies of some raw materials.

Dye Manufacture in Poland.—The Polish chemical works "Boruta" recently commenced the manufacture of dyes, of which 2½ tons were produced in the third quarter of this year. A new dye named "Futromin" is in production; it is largely manufactured from the same materials as "Ursole," which was produced by the German dye trust I. G. Farben before the war.

U.S. Electron Microscopy Developments.—At the fourth International Microbiology Congress, held recently in Copenhagen, Professor W. G. Wyckoff, revealed that developments in the field of electron microscopy had made it possible to "photograph organic particles of the dimensions of antibody globulin molecules."

Tin Mine Closing.—The Mount Bischoff mine, near Launceston, Tasmania, once the richest tin mine in the world, is closing down. It has recently been worked by the Australian Commonwealth and Tasmanian Government owing to the urgent need for tin, but the ore has now reached such a low grade that it is uneconomical to work the mine further.

Swiss Patent for Soldering.—A solder for aluminium and its alloys has been patented by a Swiss firm. The solder is formed into rods consisting of zinc, aluminium, copper and lead, together with mechanically hard mixing crystals. The melting point is at 300° C.—considerably lower than that of aluminium.

Explosion at Cadiz.—An explosion occurred in a workhouse containing chemical products at the Larrinaga and Echevarrieta shipyards, Cadiz, on Tuesday last. The resulting fire quickly spread to stocks of torpedoes and munitions at a submarine depôt nearby. Cadiz hospitals were said to be so full that casualties are being sent to other towns.

Offer to Nazi Victims.—According to a Foreign Office announcement, German émigrés who were removed from office by the Nazis will be enabled to regain their nationality, where deprived of it by Nazi action, and will be given opportunities of returning to their positions in the British occupied zone.

Australian Cellulose Acetate. — The Australian Colonial Sugar Refining Company has decided to establish a £1,000,000 (Australian) chemical factory in Sydney to manufacture enough cellulose acetate to meet all Australian requirements. The company is also erecting a factory at Concord, near Sydney, to manufacture asphalt floor tiles, a flooring material not previously made in Australia but extensively used in other countries.

French Industrial Goods for Polish Coal.—Two new French agreements with Poland provide for deliveries of five million tons of coal to France during the next four years. According to the first agreement, France is to receive one million tons of coal between now and the end of the year in exchange for chemicals, woollen materials and machinery. In the course of the four-year agreement, France will supply increasing quantities of motor cars and industrial equipment in exchange for the other four million tons of Polish coal.

Norsk-Hydro's Capacity to be Increased.—The capacity of the Norsk Hydro, the well-known nitrogen group in which French capital participates, is to be increased by 150,000 tons per annum when the new hydroelectric power station at Glomfjord is completed. The new electric energy will be used for the manufacture of liquid ammonia, which will be shipped to the group's plant at Horoeya for the manufacture of various nitrogeneous substances, chiefly calcium nitrate. It is reported that the new power station will be ready by the winter of 1949-50.

Company News

Bede Metal and Chemical Company is to pay an interim dividend of 6¼ per cent on account of 1947. In 1946 a single dividend of 9⅜ per cent was paid.

Alpha Cement Ltd. has decided to redeem all the £237,151 outstanding 5 per cent debenture stock on December 31 at 105 per cent plus one half-year's interest.

Palestine Potash Ltd., announces a dividend of 5 per cent, less tax on the ordinary and "A" ordinary shares for 1946. This is the first dividend paid by the company since its registration in 1929. An interim of 2½ per cent on account of 1947 has also been announced. Gross profits in 1946 amounted to £57,855.

Imperial Chemical Industries Limited have declared an interim dividend of 3 per cent (actual) in respect of the year ending December 31, 1947, on the company's ordinary stock; it will be payable on December 1, 1947, less United Kingdom income tax at the standard rate, to members on the register on October 9, 1947. Dividend transfers should be lodged at the company's transfer office, 34 Portland Place, W.1, by not later than October 2, 1947.

Chemical and Allied Stocks and Shares

AWAITING the decision as to an autumn Budget, stock markets have been extremely quiet in view of the uncertainty as to a new scheme of profit or dividend limitation. Buyers favoured British Funds which rallied under the lead of 2½ per cent Consols and 2½ per cent Savings Bonds, partly on the assumption that official support may be forthcoming for this market, while it is also assumed that the large sums released in due course from the "share-out" money in respect of Argentine railway debentures, will be mainly reinvested in British Funds.

Chemical and allied shares have been firm and where changed showed a number of

moderate gains. Imperial Chemical were good at 48s. 7½d., the unchanged interim dividend being in accordance with general expectations. The prevailing view is that, granted there is no serious fuel crisis in the winter there will be good prospects of the total again being 10 per cent for the year. Monsanto Chemicals 5s. shares were 56s., but B. Laporte have eased to 77s. 6d., W. J. Bush were 90s. Fisons changed hands up to 66s. 3d., and in other directions, Major & Co.'s 2s. shares were 3s. 6d.; with Greeff-Chemicals Holdings firm at 15s. 6d. The units of the Distillers Co. were active and higher at 140s. on wider recognition of the company's export trade scope. United Molasses became less active around 48s., British Plaster Board were 24s. 9d. Borax Consolidated were steady at 53s. 9d., and British Match strengthened to 42s. 9d., but British Aluminium at 44s. 6d., lost part of their recent rise.

General Refractories strengthened at 21s. Moreover, the possibility of early re-opening of the London Metal Exchange improved Amalgamated Metal shares to 16s. 7½d., and Imperial Smelting were better at 19s. 1½d. Paint shares received more attention on current trading reports and dividend estimates. Lewis Berger rallying to £7 while International Paint rose to £6¾, and Pinchin Johnson were firm at 56s. 6d.

Iron and steels remained firm with further moderate gains on balance, the view having gained ground that nationalisation of the industry may be regarded as indefinitely postponed. United Steel, helped by expectations that the forthcoming dividend will be maintained, were better with business up to 26s. Dorman Long were 25s., Guest Keen 47s. 3d., and Colvilles also improved to 25s. 9d. Elsewhere, Babcock & Wilcox rose further to 71s. 6d. Allied Ironfounders were 52s. 6d. Tube Investments touched £6¼, with Stewarts & Lloyds up to 52s. 6d. Indian Iron, however, fell to 46s. 3d. on fears that the Indian troubles are affecting the company's earnings. In most cases textiles shares failed to hold best levels, but were slightly higher on balance with Bradford Dyers 22s. 3d. Calico Printers 21s. 4½d., Courtaulds 49s., and British Celanese 27s.

Elsewhere, De La Rue have been 50s. British Glues & Chemicals 4s. ordinary changed hands around 18s. 9d. Turner & Newall were 71s., Levers steady at 50s., with Low Temperature Carbonisation 2s. shares slightly higher at 4s. 4½d. Sangers firmed up to 29s. Timothy Whites were 41s. 9d. Boots Drug 57s. 3d., and Wall Paper Manufacturers deferred 43s. Dunlop Rubber were again prominent and higher at 72s. in response to the scope for expansion in earnings and dividends if export targets can be attained and there is no Government scheme of dividend limitation.

Oils were again mainly affected by international political developments, Anglo-Iranian and Shell both moving irregularly, while Burmah Oil were lower on balance. Trinidad Leaseholds and other Trinidad oil shares responded to talk of higher American oil prices. Mexican Eagle oil shares were little changed, the full text of the compensation agreement containing no surprises.

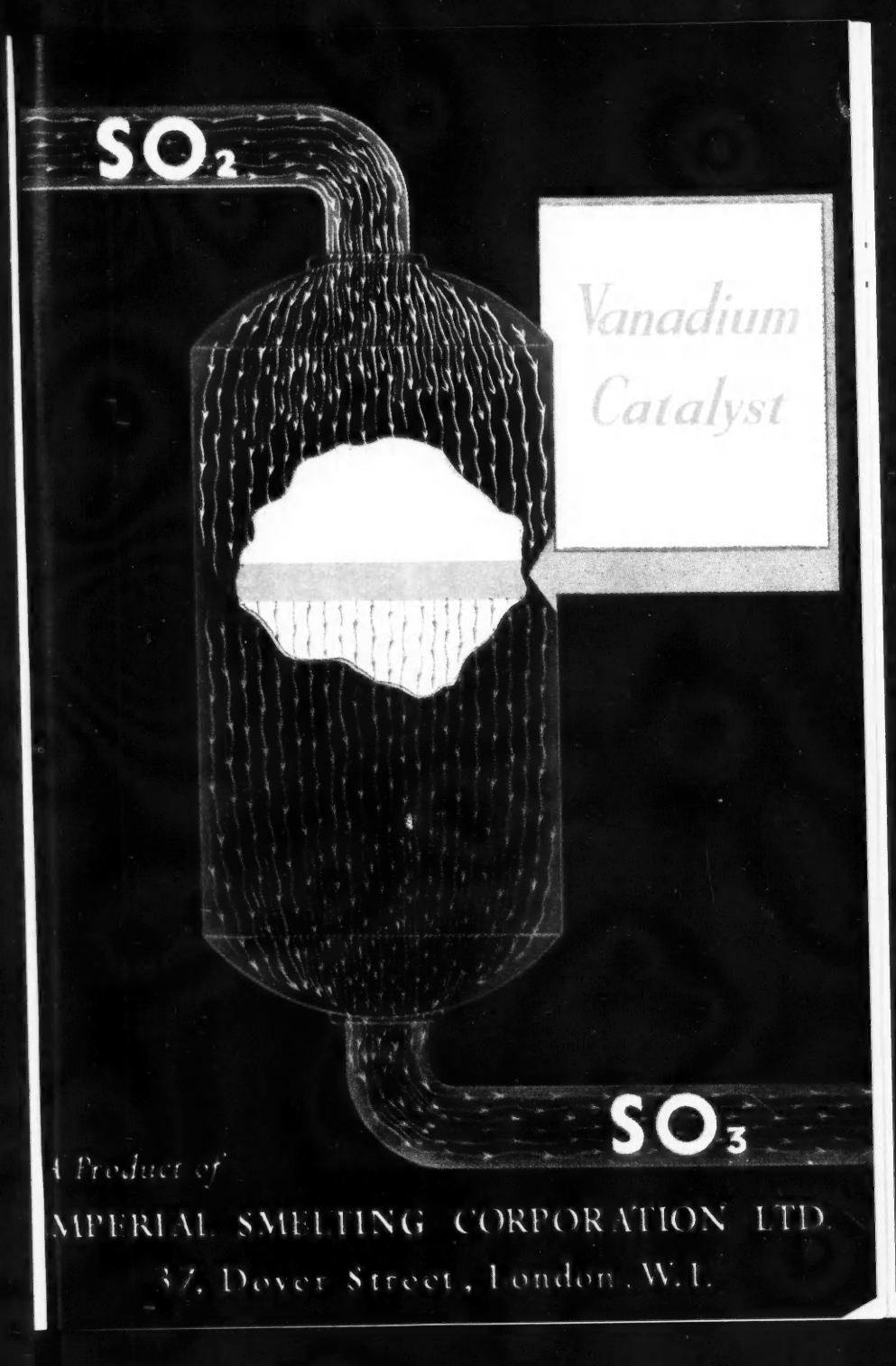
British Chemical Prices

Market Reports

ACTIVITY in the industrial chemical market during the past week has been fairly sustained and inquiry for new business for home needs and for shipment has been reasonably widespread. The price position is generally strong, and although quotations in this section remain at or about recent levels and upward movement would not be unexpected, there is an unsatisfied demand for most of the potash products, particularly chlorate of potash and caustic potash. Permanganate is moving well and is firm. In the soda products section, a good call is reported for dibasic and tribasic phosphate of soda, hyposulphite of soda, sodium sulphide, while supplies of caustic soda and soda ash and Glauber salts are below current requirements. Lead oxides are in steady demand and there is a ready outlet for zinc oxide and tin oxide. The scheduled rates for white lead and red lead are unchanged at the time of this report. Among acids, oxalic, acetic, and hydrochloric, are in active request and elsewhere hydrogen peroxide, formaldehyde, arsenic and barium chloride are in good demand. In coal-tar products an upward revision of control prices is under consideration. Demand is fully maintained with pitch actively sought at the higher price level.

The Board of Trade announces this week an increase in the price of Chilean nitrate of soda, industrial refined quality, as from October 1, to cover the increase in rail freight charges. The new price is £18 15s. per ton for 6-ton lots delivered carriage paid to the buyer's nearest station.

MANCHESTER.—From the point of view both of the number of new inquiries and the actual volume of additional business trading conditions on the Manchester chemical market during the past week have been brisk enough. Replacement buying in the case of bleaching, dyeing and finishing chemicals has been on steady lines and other lead industrial consumers have also been in the market, which keeps very firm in most sections. In the fertiliser market a fair amount of business considering the time of the year has been reported. In the by-products section a steady outlet is being found for most of the leading lines—light as well as heavy.



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Patents in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Process for effecting catalysed reactions.—Universal Oil Products Co. Jan. 30, 1939. 19579/1947.

Treatment of acid tars, particularly those obtained from pyroligneous acid.—Usines de Melle. Dec. 17, 1943. 18011/1947.

Liquid oxygen converters.—W. A. Wildhack. Feb. 13, 1946. 3681/1947.

Oxygen pumping systems.—W. A. Wildhack. Feb. 15, 1946. 3746/1947.

Production of stainless steel.—Alloy Research Corporation. Feb. 18, 1946. 2005/1947.

High tin solder compositions.—Aluminum Co. of America. Dec. 29, 1939. 20259/1947.

Solder flux compositions.—Aluminum Co. of America. Nov. 30, 1939. 20260/1947.

Solder flux compositions.—Aluminium Co. of America. Nov. 30, 1939. 20614/1947.

Solder fluxes.—Aluminum Co. of America. Sept. 8, 1944. 20615/1947.

Formation of oxide coatings on aluminium.—Aluminum Co. of America. Feb. 15, 1945. 21635/1946.

Etching of aluminium surfaces.—Aluminum Co. of America. March 13, 1944. 21636/1946.

Oxide-coated aluminium articles.—Aluminum Co. of America. Feb. 20, 1943. 21637/1946.

Production of protein-containing coatings on aluminium surfaces.—Aluminum Co. of America. Feb. 15, 1945. 21638/1946.

Production of pyrazine.—American Cyanamid Co. May 20, 1942. 21189/1947.

Sintering machines and pallets.—American Ore Reclamation Co. July 5, 1940. 20694/1947.

Process for the production of sodium carbonate.—Bata, Narodni Podnik. May 19, 1941. 21250/1947.

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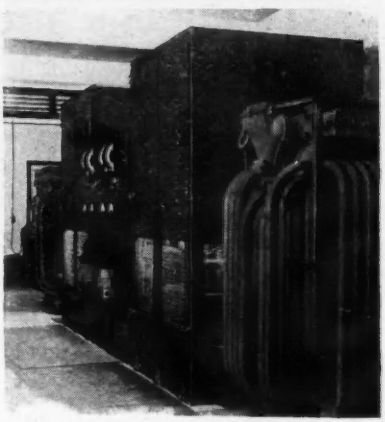

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SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 *and* 50 *inclusive, or a woman between the ages of* 18 *and* 40 *inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.*

COAL TAR RESEARCH

APPLICATIONS are invited for the appointment of a Director of Research to the Coal Tar Research Association which is in process of formation. The commencing salary will be not less than £2,000 per annum and provision will be made for a pension scheme. Applications should be marked "Confidential" and addressed to the CHAIRMAN OF THE COUNCIL, Coal Tar Research Association, Gas Industry House, 1, Grosvenor Place, London, S.W.1.

CHEMICAL Engineer required for interesting development work on coal tar products. Apply, THE MIDLAND TAR DISTILLERS LTD., Oldbury, Birmingham.

CHEMIST (graduate) required by Bahrein Petroleum Persian Gulf with at least three years petroleum refining experience. Commencing salary £648 plus free board, air cooled accommodation, medical attention. Provident fund. Apply with full particulars Box No. 2532, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

LABORATORY Assistants, junior and senior, required for the preparation of standard solutions and other reagents, in Central London laboratory. Male or female. Good wages scale and facilities for evening classes. Box No. 2535, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

PLANT Chemists urgently required for Process Plant Operation by large company operating in the Middle East. Applicants need not be Graduates but should have had a chemical training up to Inter. B.Sc. or National Certificate Standard with experience of shift work in either a gas, coke oven or chemical works. Age not over 30. Salary in sterling between £540 and £600 per annum, plus generous allowances in local currency, with free furnished bachelor accommodation, passages out and home, medical attention, also kit allowance and Provident Fund benefits. Apply, stating age, qualifications and experience, etc., to Dept. F.22, Box No. 2435, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

IMPERIAL CHEMICAL INDUSTRIES LIMITED require young Mechanical Engineers, age 21-35 years, with first- or second-class honours degrees, for work in connection with research, development, design and maintenance of chemical plants in the Merseyside area, Fleetwood area, and on the North East Coast.

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REPRESENTATIVE for Scientific Glass and Laboratory Ware required for Manchester and district. Applicant should state previous position and salary required. Box No. 2530, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

TECHNICAL Assistant required for industrial establishment in Malaya. Age 25–35. Must have good education with first class diploma at Royal School of Mines or equivalent, and general experience in metallurgy, metallurgical chemistry and works operation. Four years agreement commencing salary £590 to £770 depending on age, qualifications and experience, with annual increments and cost-of-living bonus. Apply by letter giving details to Box No. 2531, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

WANTED, Chemist responsible to works manager, for modern Cheshire works. Plant control and laboratory work. State age, qualifications, experience and salary. Box No. 2538, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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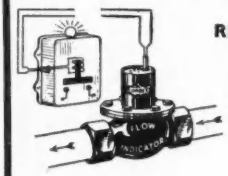

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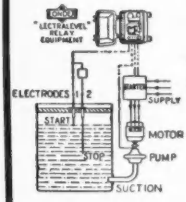

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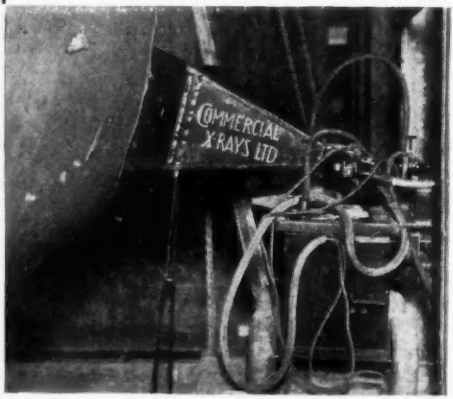

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